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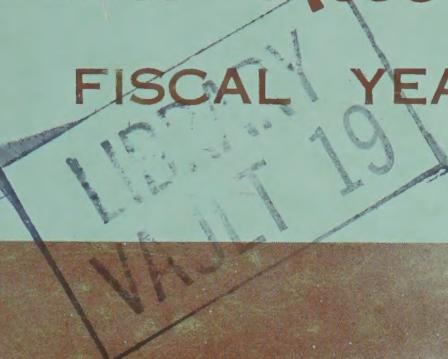
Annual Report

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Water Resources Office

FISCAL YEAR 1953-1954

Agriculture



PROVINCE OF

L.C. HALMRAST
MINISTER



ALBERTA

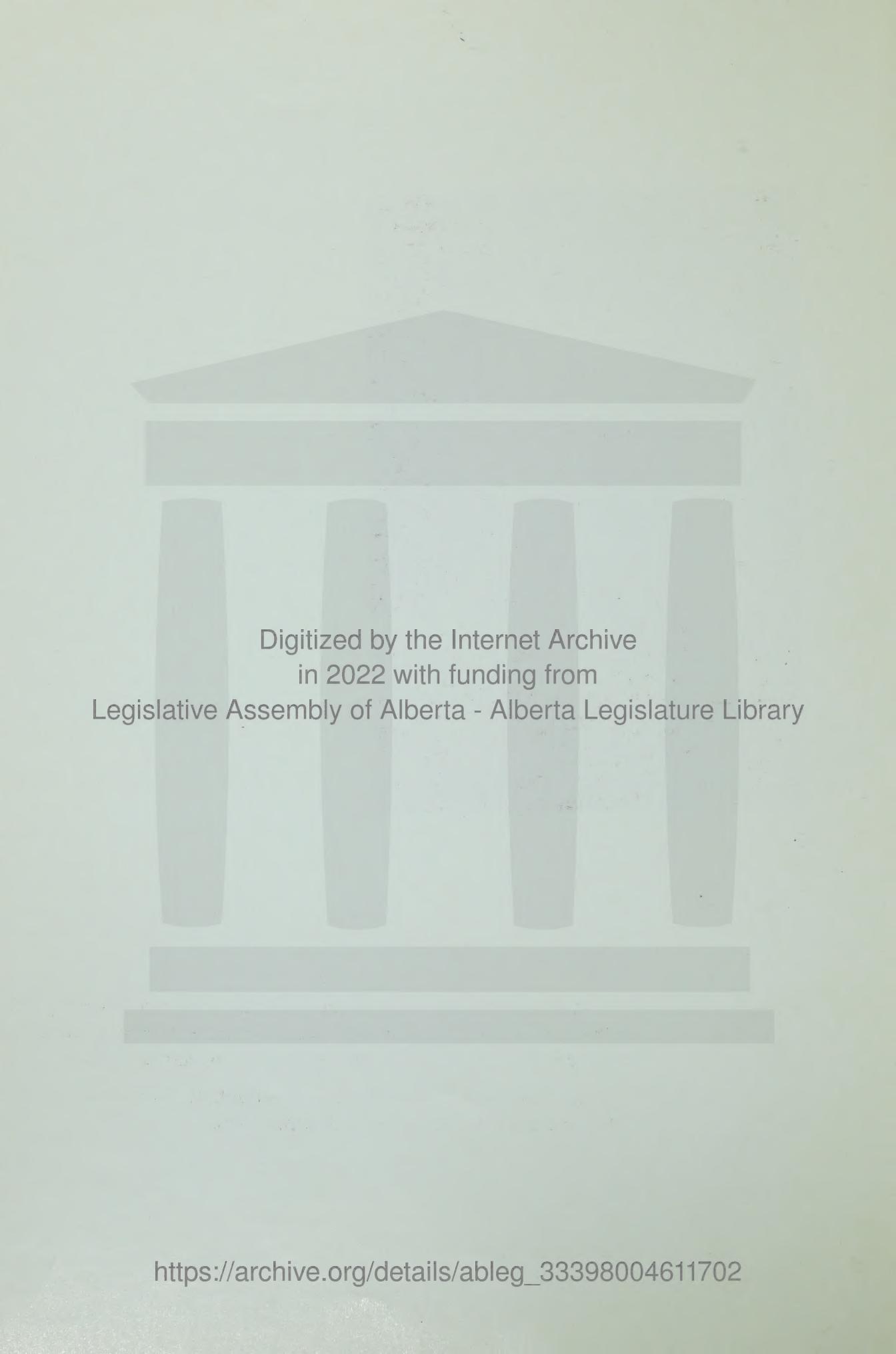
BEN RUSSELL
DIRECTOR

FEBRUARY 25, 1954



With a profound sense of personal loss we record here the passing of the Hon. D. A. Ure who was killed in a tragic highway accident on December 23, 1953 along with his companion, James Mitchell.

Mr. Ure guided the destiny of the Dept. of Agriculture for many years and we came to know and respect him.

A faint, light gray watermark of the Alberta Legislature building is visible in the background. The building features a prominent portico with four columns and a triangular pediment. The text is centered over this watermark.

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ANNUAL REPORT OF THE
WATER RESOURCES OFFICE OF THE
GOVERNMENT OF ALBERTA
FISCAL YEAR 1953-54

INTRODUCTION

This is the Third Annual Report of the Water Resources Office and as in previous reports the objective has been to give a picture of the departmental activities for the active season under review before it is rendered out of date by events. In order to do this it is necessary to estimate expenditure up to March 31st, 1954. In effect, therefore, this is a report for the year 1953.

The year 1953 was another year of heavy precipitation. The precipitation at Edmonton for 1953 was twenty-five inches compared to the long term average of eighteen inches.

Runoff from the mountains was extraordinarily high. Flood flow on the Oldman River equalled the all time high recorded flow.

While these bountiful natural supplies of water produced a record breaking crop they also caused "headaches" in localized areas. The heavy precipitation caused flooding and ponding and the heavy floods damaged roadways and eroded valley lands.

On the credit side of the water ledger it may be said that ground water supplies are at a very satisfactory level.

The latter part of 1953 was very dry and the ground is in condition to absorb a large percentage of the winter precipitation.

These observations are noted here in explanation of some of the data included in this report.

The report is divided into seventeen sections and these are as follows:

1) St. Mary and Milk Rivers Development

2) Bow River Development

3) Colonization on St. Mary River Development

4) River Protection Works

5) Water Power

6) Water Power Investigations

7) Prairie Provinces Water Board

8) Application for South Saskatchewan Project

9) Waterton and Belly Rivers Reference

10) Water Stabilization Projects

11) Drainage

12) Drainage Problems Referred to the Water Resources

Office Under Sec. 191 of the Municipal Districts Act

13) Legislation to do with Water Resources

14) Ground Water Control Act

15) Prairie Farm Rehabilitation Act

16) Other Irrigation Districts

17) Ducks Unlimited

SECTION (1) ST. MARY MILK RIVER DEVELOPMENT

(a) Number of Contracts let.

The following number of contracts were let on the St. Mary Milk River Development.

1949 - 50	5
1950 - 51	16
1951 - 52	16
1952 - 53	12
1953 - 54	18
Total to date	67

The above totals included contracts for building houses, moving houses and for construction work on the canals and structures.

During 1954 - 55 it is anticipated that 16 contracts will be let.

(b) Total amount of Contracts

The total amount of contracts on the St. Mary Milk River Development for each year to date is as follows:

	Bid Price	Actual work completed during the year.
1949 - 50	227,904.90	102,842.68
1950 - 51	2,150,775.50	1,659,179.49
1951 - 52	2,428,416.20	1,127,387.55
1952 - 53	1,579,094.06	2,903,140.48
As at Dec. 31, 1953 - 54	2,380,893.08	2,171,871.76
Total	8,767,083.74	7,964,421.96

An estimated of the 1953 - 54 construction at the end of the fiscal year, for the actual work completed during the year would be \$2,300,000.00 making a total of \$8,092,550.20 for the five years.

We estimated that next year we will let some \$2,200,000.00 worth of contracts and complete about \$2,000,000.00 worth of construction.

(c) Total of Contracts probable for 1954 - 55.

We anticipate some 16 contracts will be let at a value of \$2,200,000.00.

(d) Estimate total of Contracts

The estimated total by the end of 1954 - 55 the contracts let will be \$10,292,550.20.

(e) Estimated Expenditure for material 1953 - 54.

The estimated expenditure for material is \$775,000.00 by the end of the 1953 - 54 season. The present expenditure as at December 31st, 1953 is \$4,465,000.00.

(f) Estimated Expenditure for material 1954 - 55.

The estimated expenditure for material for the season 1954 - 55 will be about \$505,400.00. This will depend on the next years (1955 - 56) program.

(g) Estimate of Irrigable Area brought under canals 1953 - 54.

Approximately 85,000 acres were brought under the canals in 1953 - 54.

(h) Estimate of Irrigable Area brought under canals March 31st, 1954.

The total new irrigable area under the canals at the end of March 31st, 1954 is approximately 135,000 acres. Foss shows by adding up his quarter sections 179,453 acres as irrigable. However, this figure was from the plane table sheets and is very high.

(i) Estimate of Irrigable Area to be brought under canals in 1954 - 55.

We expect that a further 50,000 acres will be under contract for construction in 1954 - 55.

(j) Estimate total Irrigable Area under canals March 31st, 1955.

The 1954 - 55 construction season will see construction contracts let or completed for building canals to a total of 185,000 acres.

(k) Estimate total Irrigable Area under New Canals plus old canals March 31st, 1955.

Old St. Mary Milk River Development 82,100 Acres

Raymond 15,130 Acres

Magrath 6,985 Acres

Taber 21,500 Acres

New S.M.R.D. 185,000 Acres

Addition to Magrath and Lomond 5,000 Acres

Total 315,715 Acres

By March 31st, 1955, 315,715 acres will have canals. Construction or being constructed or will be being served with water under the new S.M.R.D. Canal.

(1) Any further pertinent information regarding the Project.

See attached report.

ST. MARY-MILK RIVER DEVELOPMENT PROGRESS 1953 - 54

After a slow start during a very wet spring construction progress has been very good during the 1953 - 54 season. Work continued on many contracts past the 1st, of December. Due to the progress during the fall there will be a very small carry over of work into the next construction season.

The main canal from Ridge to Chin Lake has now been completed and will be ready to carry the water from Ridge reservoir to Chin as soon as the Dominion Government makes it available.

The Dominion Government experienced a major failure at Ridge dam during this construction season. According to reports received by this office it was a foundation failure due to the rapid rate the load was placed on the damsite. The upstream and downstream toe have been loaded and work on the fill has been stopped. The work on the fill will be started again next season when the load on the foundation will have had time to stabilize.

We anticipate that the P.F.R.A. will be able to supply us with water from Ridge Reservoir by June 1st, 1954. If we are unable to get water through this reservoir, it will be impossible to increase the irrigable area being served above that of the 1953 - 54 season.

However, if water is available from Ridge an additional 40,000 acres of new land will receive water. This is not all the land to which canals have been completed and is ready for service. It is the amount of land which we believe the farmers will be ready to irrigate and that our staff, and staff facilities will be able to handle. Of course, a dry year could have a marked affect on this



1953 St. Mary River Dam, completed.

program. If the area is dry and the farmers demand water it will be difficult but they will have to be supplied. The land, will however, not be prepared for irrigation and irrigating will be difficult.

By the end of 1953 - 54 season some 137,000 acres of land should have been served. Of this amount about 100,000 acres will be ready for service in the spring. This includes 13,500 acres which have already received service in the Taber and Fincastle area.

The project will by the spring of 1954 have a total of 263,000 acres which are either being served, or the contracts have been let for the construction, or are completed and capable of being served.

By spring 1955 this will have risen to some 313,000 acres.

During the last season some 139,000 acres were served including some 139,000 acres of new construction.

Construction on the Chin dams, which was to be a three year contract, has now been extended and will take four years to complete. The reason being that the engineers wish to give the foundation material a longer period for settlement than they previously considered necessary.

The canals will be nearly completed in a portion of the Medicine Hat area and next year for the first time it will be possible to take water from the St. Mary River through the new canal system to the lands in the Medicine Hat area. This is a real milestone in the construction of this project.

By the end of 1954 - 55 we will have completed all the work under the low line canal except two contracts, the Cameron Ranch and an area south and

west of the Chin. We will then have 187,000 acres of irrigable land served by new construction. This along with the old project will mean that the St. Mary River must supply water for 313,000 acres.

It is well known, that the Canadian Share of the St. Mary River will supply about 90,000 acres of new construction. So that we are short water for some 97,000 acres. As long as we are able to use the U.S. Share of the St. Mary and until the area constructed reaches full development the problem of the water supply does not become critical.

If, we are to continue construction, it is now essential that more water be made available. The Waterton and Belly Rivers are the sources of the only additional supply available and we must now urge the Canadian Government to start construction of this part of the system.

Whether the Dominion Government will start construction before the Waterton Belly reference is concluded is a matter of conjecture. This point should be settled and if they will not then it is very urgent to complete a treaty on the Waterton and Belly in the near future.

Costs to Date

1949 - 50	94,792.33	
1950 - 51	1,673,563.07	
1951 - 52	2,308,185.04	
1952 - 53	3,816,149.31	
1953 - 54	3,801,700.00	Estimate to end of year.
<hr/>		
Total	11,739,360.75	

The Alberta Government will have spent an estimated \$11,739,360.75 on the project up to March 31st, 1954.

To find the cost per acre the cost of the canal Ridge to Chin must be divided between the high and low line canal system. As about $\frac{1}{2}$ the irrigable area is below the high line and one half below the low line we have split this cost equally between the two.

Cost of Construction Ridge to Chin	3,560,000.00
Chargeable to low line canal	1,780,000.00
Chargeable to area Construction on low line (137,000 acres out of approx. 200,000 Acres)	1,218,300.00
Total Cost to Alberta of area under Construction 137,000 acres \$11,739,361.00 - 1,218,300.00	= \$10,521.061.00
Cost per Acre	\$ 76.80

To this must be added a portion of the Dominion Government costs if we are to find the total cost to date.

Expenditure to date by the P. F. R. A.

To March 31st, 1953	\$12,501,018.00
Estimates Expenditure to Dec. 31/53	14,000,000.00

This expenditure is chargeable to the total irrigable acreage = \$36.67

Estimated total cost per acre to date = \$76.80 PLUS \$36.67 = \$114.47 per Ac.

In 1950 irrigation construction in the U.S. varied from \$28.00 per acre in Nevada to \$296.00 per acre in Oklahoma. Average for the Western U.S. was \$72.00 per acre. It may be noted that the average cost for the Western states was in --

1910	22.00 per Acre
1920	36.00 per Acre
1930	46.00 per Acre
1940	50.00 per Acre
1950	72.00 per Acre

and in

Showing a rising cost over the years, and showing that our costs are not unreasonable when compared to the estimated cost of \$44.00 per acre in the Milk report.

Table included with this report show:

The expenditure for each year under various headings.



1953 Travers Dam, Bow River project.

YEARLY EXPENDITURES ON ST. MARY AND MILK RIVER DEVELOPMENT

	<u>1949-50</u>	<u>1950-51</u>	<u>1951-52</u>	<u>1952-53</u>	<u>1953-54</u>	<u>As at Dec. 31/53</u>	<u>Estimated Exp. to end 1953-54</u>	<u>Proposed 1954-55</u>
Printing and Stationery	326.46	1,559.42	1,317.13	1,162.35	1,500.00	2,000.00		
Permanent Equipment	36,001.00	85,346.02	67,362.68	34,843.33	60,000.00	100,000.00		
Freight Express Cartage	1,153.17	542.15	14,822.72	21,909.72	25,000.00	20,000.00		
Advertisement	1,703.91	2,304.17	3,125.51	2,263.79	1,164.02	1,200.00	2,000.00	
Wages and Salaries			19,450.92	51,947.12	58,382.15	100,000.00	130,000.00	
Repairs, replacements, Gas and Oil		15.25	3,566.51	13,330.25	14,506.97	30,000.00	17,000.00	
Legal Fees	2,722.89	3,957.50	1,582.68	3,505.24	5,000.00		3,500.00	
Materials	1,197.01	855,807.15	675,126.18	446,557.34	775,000.00		505,400.00	
Contract Labour	6,670.26	16,108.10	59,548.01	15,087.70	25,000.00		25,000.00	
Contracts (Construction)	400.00	92,588.42	1,561,155.22	1,231,253.04	2,931,331.07	2,184,147.84	2,700,000.00	
Compensation (right of way)	61,632.13	81,116.36	33,457.97		20,260.33	70,000.00	250,000.00	
Miscellaneous	385.51	4,552.36	9,059.71		7,341.98	9,000.00	8,000.00	
Totals	94,762.33	1,673,563.07	2,308,185.04	3,861,149.31	2,808,868.97	3,801,700.00	3,212,900.00	

SECTION (2) BOW RIVER PROJECT

(a) Amount provided in the 1953 - 54 estimates.

\$ 255,000.00

(b) Date of Dominion-Provincial Agreement re construction and operation.

June 25th, 1953.

(c) Date of construction Contract.

October 28th, 1953.

(d) Amount of the contract.

The amount of the contract was \$116,838.00. This bid was very low for the type of work.

(e) Name of the Contractor.

The Contractor was F. R. Gibbs, Medicine Hat, Alberta.

(f) Number of parcels and area under canals by contract.

The area under construction contains 50 parcels, 39 privately owned and 11 belonging to the Government and Municipality.

The area has an estimated 6,339 acres of irrigable land. The actual area will be somewhat less because the irrigation canals full supply level have been lowered to the ground level. The 6,339 acres was estimated with the F.S.L. 0.5 feet above the average ground level.

(g) Amount of Expenditure as at March 31st, 1954.

By the end of March 1954 we should have expended \$200,000.00.

The contractor will have completed about \$15,000.00 of his work the remainder

will be for survey, materials and equipment.

(h) Amount in Estimates for 1954 - 55.

\$ 755,000.00

(i) Number of Contracts for 1954 - 55.

Three new contracts and the completion of the Contract number one.

(j) Location of distribution canals for 1954 - 55 program.

The 1954 - 55 program will see completion of the particular lateral system started in 1953 - 54 and also two contracts on the main canal to the area north and east of Lomond.

(k) Any further pertinent data or information relating to the Project such as Crown land, parcels contained in areas, location and construction of buildings for operation, etc.

In the year 1955 - 56 it is proposed to construct the distribution system for the area served by the new main canal and continue on the construction of this canal.

Also it is proposed during the 1955 - 56 season to construct the river Bow area. Cancellation of the leases in this area has already been started. This area will supply some 65 quarters for land settlement.

The proposed office building to serve the project will be built at Enchant during 1954 - 55. Two houses will also be constructed to serve the two ditchrider units which will have been constructed by that time.

COLONIZATION

SECTION 3 ST. MARY RIVER DEVELOPMENT

(1) The Personnel of the St. Mary and Milk Rivers Development Colonization Manager's Advisory Committee is as follows:

S. S. Graham, Supervisor of District Agriculturists,
Department of Agriculture, Edmonton, Alberta.

D. LeBaron, Fieldman, Soldier Settlement and Veterans' Land Act,
Lethbridge, Alberta.

Mark Mann, Administrative Officer, Prairie Farm Rehabilitation,
Administration, Department of Agriculture of Canada,
Vauxhall, Alberta.

V. A. Wood, Director of Lands, Department of Lands and Forests,
Edmonton, Alberta.

Note: - As our records are on the calendar year basis and we cannot supply information on the Government fiscal year basis, the answers to the balance of the questions will be on the calendar year basis.

(2) The number of parcels purchased by the S.M.R.D. Colonization Manager in 1953 was 28 with a total area of 4,467 acres.

(3) The total number of parcels purchased up to the end of 1953 by the S.M.R.D. Colonization Manager was 112 with a total area of 17,813 acres.

(4) In 1954, we expect to purchase about 106 parcels with a total area of about 16,900 acres.

(5) In 1953, 1,700 acres of irrigable land were levelled on 31 parcels of land.

(6) At the end of 1953, a total of 5,800 acres of irrigable land had been levelled on 111 parcels of land.

(7) It is estimated that 3,500 acres of irrigable land will be levelled on 58 parcels of land in 1954.

(8) In 1953, land was allotted to 26 veterans of World War II to and 13 non veterans.

(9) Altogether 49 parcels of approximately one quarter section each were sold to veterans of World War II and 28 parcels of approximately one quarter section each were sold to non veterans in the years 1951, 1952 and 1953.

(10) We expect to sell about 60 quarter sections in 1954.

(11) At the end of 1953, we had 39 veterans and 15 non-veterans who are qualified for land settlement, but they could not be placed because we had no land where water was available and the land had been levelled and classified. We find that it is not advisable to allot land until the works are ready for use, water is available and the irrigable land has been properly levelled and classified.

(12) A summary of the applications for irrigation in the addition to the St. Mary and Milk Rivers Development at the end of the year 1953, was as follows:

Total number of applicants (i.e. individuals, partners, corporations and estates) was 596.

Total number of parcels (i.e. quarter sections or less) was 1,264.

Total number of irrigable acres was 125,383.

3 owners have only 40 acres each

19 owners have only 80 acres each

496 owners have 160 acres or more each, with an average of 2.04 quarter sections each.

The largest owners, being two in number, each own ten quarter sections. There are only 39 owners who own 5 or more quarter sections each. The 39 owners own a total of 231 quarter sections.

The canvass is not complete but over 90% of the owners have applied for water for irrigation.

Note: - This summary does not include two large owners who have agreed to transfer part of their irrigable land to the S.N.R.D. colonization manager for non irrigable land.

SECTION (4) RIVER PROTECTION WORKS:

All of the streams in Alberta are subject to periodical flooding which sometimes cause damage to private property. The two main causes for floods are:

First: - Extraordinary high rate of runoff from the drainage area.

Second: - Backwater floods due to ice jamming.

The variation of flow in Alberta streams from day to day, from month to month and from year to year is tremendous. Such variation will increase as the drainage areas become denuded of natural cover such as grass, brush and trees and as highway, road and other drainage is increased.

The winter flow of the North Saskatchewan River which is at the rate of from 500 cu. ft. per sec. to 1200 cu. ft. per sec. during the winter months will rise to as much as 20,000 to 30,000 cu. ft. per sec. in a normal year and was actually as high as 204,500 cu. ft. per sec. on June 28th, 1915 or 209 per cent of the minimum rate of flow. The other streams have similar characteristics.

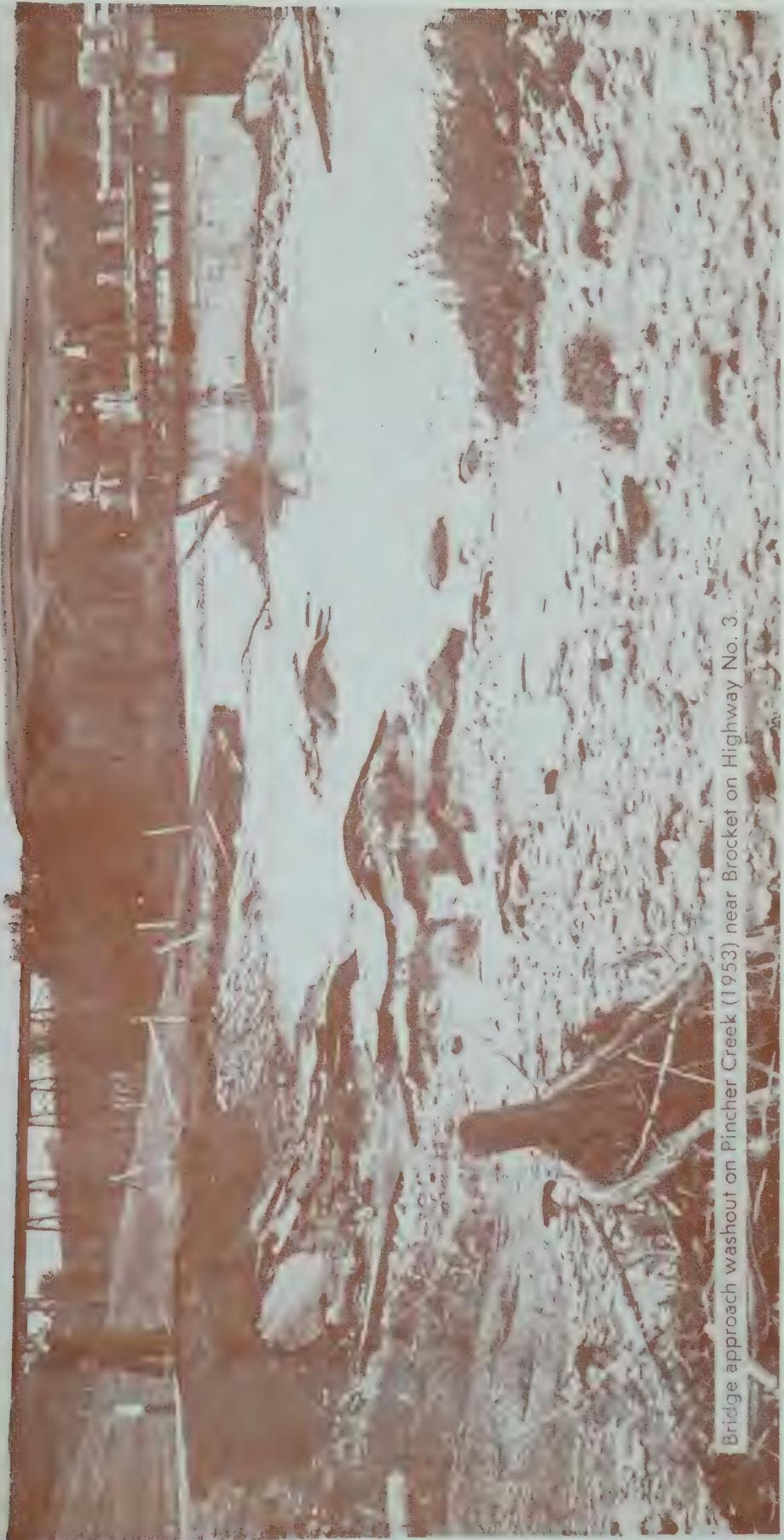
Due to the accumulation of frazzle ice, which forms in all turbulent streams under freezing conditions, ice jams form which tend to obstruct the flow. Where these jams freeze, solid dams are formed which raise the water level behind them to the point where the pressure becomes great enough to destroy the dams. This backwater effect is the cause of winter floods.

In the early days floods caused little damage because there was then little to damage. In more recent years, however, there is a tendency to ignore the advice of the old timers in the Country, who have knowledge of flooding possibilities and to more and more encroach on the streams then look to the Governments for protection.

Prior to 1930 the Water Resources were the responsibility of the Dominion Government and although there was provision in the Irrigation Act for the protection of the water supplies and also in the Navigable Waters Act for the protection of navigation there was no provision for the protection of private property.

Although the Federal Government was, at times, forced by public opinion to construct certain river protection works, such works were constructed as unemployment relief measures by which private owners benefited.

Since the transfer of the Water Resources from the Dominion to the Provinces the Federal Government has no further jurisdiction over the streams except in the Parks and, possibly, in Indian Reserves and, of course, under the Navigable Waters Act.



Bridge approach washout on Pincher Creek (1953) near Brocket on Highway No. 3.

River protection works are difficult to design and expensive to construct and maintain for a number of reasons.

Structures which might stand up to floods under open water conditions can be rapidly destroyed by ice jams under ice conditions.

Because of the meandering tendency of streams expensive works can be readily by-passed through old channels or new channels cut by the stream in flood stages.

It can be anticipated then that just as soon as Governments accept responsibility for the protection of private property against flood damage, an expensive and extensive program of river protection works will be inevitable.

(a) The Little Bow River heads on the bank of the Highwood River near the Town of High River and flows in a south easterly direction to join the Oldman River in Township 11, Range 19, West 4th Meridian. The Highwood River flows in a north easterly direction to join the Bow River in Township 21, Range 28, West 4th Meridian. The tendency here is for the Highwood River to return to the Little Bow Valley which was possibly its original channel before the ice age.

In 1918 the Highwood River did actually burst its banks about four miles above the town of High River and was only prevented from returning to the Bow River channel by protection works constructed by the Reclamation Service which at that time was administering the streams of Alberta.

Since that year it has been a continual fight to maintain the Highwood River in its present channel and protect property (including the town) which is

incidentally flooded due to the efforts of the river to change its course.

To prevent the stream by-passing the works which were originally constructed in 1918 but repaired, enlarged and extended from time to time since that year an amount of \$78,515.00 was spent in 1952 and 1953 for protection works consisting mainly of dykes protected with rip-rap faces consisting of river gravel and boulders wired in place. This is an alternative to Frank slide rock which is exceedingly expensive. It is hoped that the gravel and rock faced fills will effect a cure.

The Oldman River, which periodically goes on the rampage, has been for some years threatening to undermine the highway and incidentally a portion of the town. In 1952 the first leg of a deflecting dyke which was built to turn the river away from the town of Fort Macleod was hardly completed when in 1953 along comes a bigger and better flood than ever and, although the highway and town were miraculously saved by the dyke, the river at that high stage washed away a considerable area of land along the south bank above the dyke and threatened to by-pass the dyke again along the south bank below the town and highway. The type of protection built was a face of boulders wired in place similar to the work done on the Highwood River.

At a point opposite to the headworks of the Lethbridge Northern District diversion works, the river at high stages has for some years been working toward the north and threatening to by-pass the works. Some work to maintain the original channel has been done here from time to time in past years. However, the 1953 flood damaged these works and caused a more dangerous situation then ever. Pro-

tection works are now under construction at this point. The estimated cost of these works is something like \$90,000.00 depending upon the effect of next years high water.

The Crowsnest River at Blairmore, Coleman and other points are man made problems due to encroachment on the river by the Mining Companies and their employees. Not only spring and summer floods every year cause property damage, but winter floods also. Adequate protection works along this stream would be very costly and probably much more than the value of the property to be protected.

The first step to a solution of this problem is an accurate contour map showing all elevations, buildings, property lines and other information from which to design and estimate the cost of adequate protection works, and from which to make some valuation of the properties endangered. Such a map has now been prepared by the Spartan Air Services Ltd.

The Red Deer River at Drumheller is another difficult problem mainly because of encroachment on the river. Some works, mainly for the protection of the highway but incidently for the protection of property along Michichi Creek were constructed in 1952, but additional works soley for the protection of town and private property are being requested.

Medicine Hat is located at the junction of the Oldman River, Seven Persons Creek and Ross Creek, and is subject to flooding from all three or either one of these streams.

Seven Persons and Ross Creek were improved through the city during the last two years and a reservoir at the headwaters, primarily for irrigat-

ing land of the St. Mary and Milk River Project, but incidentally to regulate the flow of Seven Persons Creek, is now under construction. This should have considerable beneficial effect on flooding conditions at Medicine Hat.

A highway problem in connection with the crossing of MacKay Creek at Walsh developed in 1951. A diversion was made of the creek at that point which incidentally has been of benefit to the town of Walsh.

EXPENDITURE ON RECENT PROVINCIAL PROJECTS
(Nearest Dollar)

<u>Name of Project</u>	<u>Previous Expenditure</u>	<u>1953 - 54 Expenditure</u>	<u>Total To Date</u>
Highwood River Control Works	45,118.	33,397.	78,515.
MacKay Creek at Walsh - Flood Protection	36,690.	892.	37,582.
Macleod Irrigation District	72,050.	21,400.	93,450.
Oldman River Control at Fort Macleod	22,377.	68,479.	90,856.
Medicine Hat Flood Control	35,030.	37,769.	72,799.
Bow River Dyke at Calgary	10,307.	1,402.	11,709.
Crowsnest River Control at Blairmore		3,600.	3,600.
Lake Level Stabilization	66,394.	8,000.	74,394.
Heart River Control	200,000.		200,000.
Peace River Dugout Program - Dept. Agriculture	184,725	12,463.	197,188
	(2048 dugouts)	(115 dugouts)	(2163 dugouts)
Lethbridge Northern Headworks		90,000. (estimate)	90,000. (estimate)

SECTION (5) WATER POWER:

Part II of the Water Resources Act relating to Water Powers provides as follows:

Until the Lieutenant Governor-in-Council makes regulations, etc. etc. -- the water power regulations established under the Dominion Water Power Act, etc. etc. shall apply for administering provincial water powers and such lands as may be required in the development, operation and use thereof the "Minister" being substituted for the "Minister of the Interior". "the Supreme Court of Canada" substituted for the "Exchequer Court of Canada", "Provincial lands" being substituted for "lands of the Dominion", "the Water Resources Act" being substituted for the "Dominion Water Power Act" respectively.

The regulations under the Dominion Act are very comprehensive.

One of the main purposes is to establish a statutory authority with the right to control not only the power site but all lands, works, and operations necessary for developing and using power.

Since the transfer of the natural resources from the Dominion to the Province in 1930 the water power of Alberta except in Dominion Parks and Indian Reserves, is administered under the provisions of the Water Resources Act.

The attached table gives the power and storage development on the Bow River showing date of completion of the various projects, the effective heads, maximum turbine discharges, maximum horse power capacities, showing also the capacities of reservoirs constructed to increase the winter flow from some 500 c.f.s. up to some 2000 c.f.s.

(a) Pursuant to an agreement dated March 4th, 1953, between the Province of Alberta and the Calgary Power Limited an Interim License dated March 9th, 1953 was issued to the Company. The Agreement provides that whereas the Province has directed and ordered the Company to proceed with the construction of the Bearspaw development and the Company is prepared to develop the site under the following conditions that the Company will be granted the right in accordance with the Regulations:

- (a) to extend the Ghost Plant by the addition of 30,000 H.P.;
- (b) to complete the development of power at sites on the Bow River between the Ghost Plant and Bearspaw;
- (c) if further ice investigations establish the desirability of such measures as a prerequisite to the Shepard Development:
 - (1) to redevelop the Calgary Water Power Company site in the city of Calgary to the maximum feasible head and/or
 - (2) to take other measures designed for reducing the amount of slush that might enter and choke the Shepard canal, such as the excavation of gravel in front of the Western Irrigation Development dam and other excavations upstream above or below the proposed Calgary Water Power Development so as to form an ice cover and stabilize the movement of slush.

Other provisions of the Agreement are as follows:

That on termination of the Spray Interim License or Final License etc. etc. the Province shall be bound to acquire at the same time the Bearspaw Power Development -- etc. etc.

That the Company shall from time to time after consulting the Minister or his representative, carry out experiments to determine factually the effect if any, of high and low discharges and variations in discharge from the Bearspaw Plant on ice conditions through Calgary etc. etc.

If the Company applies for a license from the Federal or Indian authorities for the right to develop the Russell Site the Province will at the request of the Company notify the Federal or Indian authorities that the granting of such application is satisfactory to the Province.

The forms of license are similar to licenses for water power development in the Province and provider briefly as follows:

Filing of suitable plans in accordance with provisions of Water Power Regulations.

Complete the development within two and one-half years of the date of the license and have installed within that time machinery and equipment for the production of not less than 20,000 H.P.

Pay 25¢ per acre for all Provincial lands required by the project (excluding lands covered by water).

Pay the rentals provided for under the Water Power Regulations.

(c) Construction was commenced on the Bearspaw Development in the fall of 1953.

(d) Progress made with the Construction of the Bearspaw Development as at December 31st, 1953 was very good. The earth fill was complete with the exception of that Part adjoining the transition section; the power house

excavation is also complete and the scroll case form in place.

The framing on the north outside power wall has commenced; about twenty per cent of the reinforcing steel is in place and in the sluice dam the framing for the ogee section is now complete and ready for the concrete.

The coffer dam for the power house and spillway section is in place along with stop logs in the transition section is acting as a partial ice trap by creating some pondage behind the structure.

(e) The effect of the works this winter in catching and holding the ice flows from that section of the river above the dam is somewhat in doubt owing to the fact that during the early freeze-up stages the pond above the Bearspaw structure was not holding the slush ice and consequently much of it went on down stream to add to that made in the section of the river below. However, an ice pack has since built up stream from the Bearspaw structure with the result that the slush ice from the river above is being held.

(f) Along the stream below the Bearspaw site ice during the January cold spell has formed into thin packs and a number of movements have taken place causing high back water conditions. The condition obtaining during January 1954 would indicate the necessity of further remedial measures in that stretch of the river between the Bearspaw site and the city of Calgary. However, until the Bearspaw development has been completed and operated, the locations and types of remedial works cannot be fully determined.

(g) THE GHOST EXTENSION:

The Power House excavation and buildings are completed. Steel erectors have been concentrating on the erection of the draft tube liner. Work will be

resumed on the penstock.

The two draft tube gates are placed.

- (h) The capacity of the new unit at Ghost is 30,000 H.P.
- (i) Date of completion is now estimated to be July, 1954.
- (j) The Ghost plant will have a total installed capacity of 67,430 H.P.
- (k) The rate of flow for Ghost Plant will be about 7600 c.f.s. or peak.
- (l) The peak loading at Ghost will be ironed out to average in the river and the Bearspaw pond.
- (m) The installed capacity of the Bearspaw unit will require a flow of 4500 c.f.s. to produce for efficiency but the river does not provide this amount of water. Careful observation especially during the ice forming season will be carried on during the winter 1953-54.
- (n) It would appear from observations made in winter 1953-54 that additional ice traps may be needed both in the city of Calgary and above. The ice in the City of Calgary although it is made up only from below Bearspaw has created some of the highest backwater conditions on record. This condition could be blamed on the low temperature days rather than flow pattern as the cold period has been both severe and prolonged.

POWER AND STORAGE DEVELOPMENTS ON BOW RIVER

Date of Completion	Project	Head in Feet	Turbine Discharge in c.f.s.	Maximum Capacity in H.P.		Storage in Acre-Feet	Storage in Acre-Feet Cumulative	Remarks
				Project	Cumulative			
1911	Horeshoe Plant	72	2700	20,000	20,000	0	0	Pondage only.
1912	Lake Minnewanka			20,000	44,000			
1913	Kananaskis Plant	72	1900	12,000	32,000	0	0	Pondage only.
1929	Ghost Plant & Storage	110-75	3700	37,450	69,450	75,000	119,000	
1932	Upper Kananaskis Lake Storage			69,450	36,000			
1942	Cascade Plant and Storage	345-330	800	23,000	92,450	180,000	291,000	Replaces 1912 Development
1942	Upper Kananaskis Lake Storage			92,450	100,000	355,000	Replaces 1932 Development	
1947	Barrier Plant	155-120	1100	16,000	108,450	20,000	375,000	
1951	Spray:							
	(a) Storage			108,450	210,000	585,000		
	(b) Three Sisters Plant	65-25	800	3,600	112,050		585,000	
	(c) Spray Plant	900	800	62,000	174,050		585,000	
	(d) Rundle Plant	320	800	23,000	197,050		585,000	
1951	Kananaskis Plant Extens'n	72	1800	12,000	209,050	585,000	Third Unit added	
1954 (July) Ghost Plant		100-75	3000	30,000	239,050	585,000	Third Unit Added	
1954 (Dec.) Bearspaw		54	4500	22,000	261,050	585,000	Pondage only.	



Bearspaw Dam on Bow River near Calgary under construction by Calgary Power Co.

SECTION (6) WATER POWER SURVEYS AND INVESTIGATIONS:

Power rights on the Bow River were granted, prior to 1909, to a number of rival companies which contemplated some larger developments on the Bow River. However, in that year (1909) the Royal Securities Corporation brought these rival interests together and formed the Calgary Power Company since changed to the Calgary Power Limited. This Company was originally organized for the purpose of supplying power to the cement plant at Exshaw. For this purpose the natural falls at Horseshoe and Kananaskis were developed - the former in 1911 but - the latter not until 1913 when it was realized that in order to produce any considerable amount of firm power on the Bow River, not only would a second plant be required, but also some storage capacity for the purpose of supplementing the winter flow storage.

The necessary storage capacity was created in the year 1913 by raising the level of Lake Minnewanka by some 16 feet thereby creating some 44,000 acre feet capacity.

Although some scattered stream flow measurements were available prior to 1911, mainly to determine the flows for irrigation purposes, and consisted of measurements during the open water season only, it was not until the year 1911 that the Irrigation Branch was reorganized for the purpose of extending this service. About this time also a new Branch, called the Water Power Bureau, was set up under the Department of the Interior for the purpose of further investigating the power potential, not only of the Alberta streams, but other streams within the jurisdiction of the Department.

These two Branches working together operated in Alberta until the year 1930 when the Natural Resources of the Prairie Provinces, including the Water Resources, were transferred from the Dominion to the respective Provinces. During that period the above named two Branches gathered and published much valuable information.

The topographic and storage surveys, together with the flow measurements of important streams have since furnished the basic data for all irrigation, water power and water supply investigations which have been carried out in Alberta since that time.

Since 1909 also Calgary Power Limited, now the main producer of water power in Alberta by the judicious use of the basic data available, followed up the previous surveys with more intensive water power investigations of some of the power streams and as a result has constructed some 8 power stations on the Bow River and tributaries with a combined capacity of some 209,050 H.P. and, further, by the creation of some 585,000 ac. ft. of storage capacity in the head waters, has increased the winter flow from a minimum of some 500 cu. ft. per sec. to a firm flow of something like 2,000 cu. ft. per sec.

This Company has now under construction the 9th power station at the Bearspaw Site near Calgary at 16,500 K.W. capacity and is extending the Ghost Development by a third unit of 22,500 K.W. capacity. The completion of these facilities will increase the total generating capacity on the Bow River to some 196,000 K.W. or to over 261,000 H.P.

The analysis of the fast increasing and changing loads in Alberta by

Calgary Power Limited, and the ability of its staff to plan, design and construct the necessary facilities to make the most economical use of the water resources ~~in order~~ to take care of such loads, has so far, been, to say the least, most ingenious.

While the development of water power in Alberta now looks like plain sailing except for the cost, it should be realized, because of a confliction of interests, that this may not long be the case. Even now, on the North Saskatchewan River where there are a number of attractive potential power developments under study by the Calgary Power Ltd., the question of possible conflict between the proposed power developments and the contemplated diversion of the North Saskatchewan River for irrigation purposes, flood control and dilution purposes, require to be carefully considered.

Although Albertans in the past, have tended to over-estimate the water supplies of the Province and thereby have under-estimated the value of their Water Resources, it should be made known that the water resources of Alberta are of very great importance and may become the most important, of the resources of the Province. Therefore, these resources should be carefully conserved and protected in order that future generations will not find themselves in the position of peoples of some of the United States where streams originally of scenic and water supply value have since become so depleted and polluted as to, not only be useless as scenery and water supplies, but a menace to life and health of the inhabitants.

The other power steams in the Province, in addition to the Bow River which show promise of economical development, are the Athabaska and North

Saskatchewan Rivers. These streams were investigated, in the early days, by the Dominion Water Power Bureau and the Reclamation Service, both for storage sites and power heads, and again in more recent years by the Water Resources Department of the Province.

The following is a list of the sites on the Athabasca River.

Wild Hay site	Tp. 51, Rge. 26, W.5th Mer.
Athabasca Site No. 1	Tp. 58, Rge. 21, W.5th Mer.
Athabasca Site No. 2	Tp. 56, Rge. 21, W.5th Mer.
Grand Rapids	Tp. 84, Rge. 17, W.4th Mer.
Below Grand Rapids	

The combined total estimated capacity of these sites has been roughly estimated at about 252,000 H.P. However, until the possibility of creating storage above the proposed sites is known and capacities determined, any estimates of capacity are problematical.

POSSIBLE DAM SITES ON THE NORTH SASKATCHEWAN RIVER
WEST OF EDMONTON:

The following data is set down principally as a means of presenting recent data on topographic maps along with existing information. An attempt has been made to select those sites which would be feasible to build and would completely harness the flow of the river. The sites are listed in order commencing at Edmonton and working upstream.

GENERAL ELEVATIONS:

Water Level - North Saskatchewan River at Edmonton - 2016

General Elevation City of Edmonton - 2200

Rocky Mountain House:

River Level 3126

Difference in River Elevation 1110'

between Edmonton and Rocky Mountain House.

(1) Carvell Site:

Sec. 30, Tp. 50, Rg. 2, W.5th Mer.

Formation - Clay Shale

Elevation River 2157

F.S.L. of Dam 2300

Storage Capacity (Contour maps) 1,550,000 ac. ft.

Length of Dam on Crest - 1,400 ac. ft.

Height - 150 ac. ft.

Excellent Reservoir - Foundation poor.

(2) Tomahawk Site:

Sec. 15, Tp. 50, Rg. 6, W.5th Mer.

Paskapoo Sandstone and Blue Shale

Elevation of River - 2334

Full Supply of Reservoir 2480

Storage Capacity from contours 825,000 ac. ft.

Location on big "loop" in river.

Good spillway layout - Dam Height 150' Length 1600'

(3) Rocky Rapids Site:

(near Drayton Valley)

Surveyed Edmonton Power Company.

Location - Sec. 33 -- Tp. 50, Rg. 7, W.5th Mer.

Paskapoo Sandstone - Blue Shale

River Elevation 2480

Reservoir Elevation 2650

Height of Dam 200

Good spillway layout.

Capacity - 800,000 ac. ft. (est.)

(4) Brazeau Junction Site:

Sec. 26, Tp. 45, Rg. 9, W.5th Mer.

Elevation River 2650 (est.)

F.S.L. 2800 (est.)

Estimated Storage 500,000 ac. ft.

Paskapoo Sandstone

Length of Dam 1600

Height 150

(5) "Loop Site"

Sec. 24, Tp. 44, Rg. 9, W.5th Mer.

Elevation River 2800 (est.)

F.S.L. 2900 (est.)

Storage 400,000 ac. ft.

Paskapoo Sandstone foundation

Good spillway Layout.

Length of Dam 1400'

Height 100'

(6) Baptiste Site:

Sec. 22, Tp. 43, Rg. 8, W.5th Mer.

Elevation River 2900 (est.)

F.S.L. 3050 (est.)

Paskapoo Sandstone

Length of Dam 1400'

Height 150'

Storage 400,000 ac. ft. (est.)

NOTE: All of the above sites were investigated by a canoe survey part of
the Water Resources Office.

POSSIBLE DAMSITES ABOVE ROCKY MOUNTAIN HOUSE:

(7) Alexo Site: (Very little data)

Sec. 22, Tp. 40, Rg. 13, W.5th Mer.

Sandstone foundation.

Elevation River 3690

F.S.L. 3790

Height of Dam 100 '

Length of Dam 1000'

(8) Gap Site:

Sec. 36, Tp. 39, Rg. 14, W.5th Mer.

Elevation River 3790

F.S.L. 4090

Height of Dam 300

Length of Dam 1800

Storage Capacity 1,400,000 ac. ft.

Sandstone or Limestone foundation.

(9) Tershishner Site:

Sec. 34, Tp. 38, Rg. 17, W.5th Mer.

Sandstone foundation

Length of Dam 700

Height of Dam 200

Elevation River 4100

Elevation F.S.L. 4300

Very narrow cross-section

Good spillway layout.

Storage capacity 400,000 ac. ft. (est.)

(10) Waterfowl Lakes Storage:

Very little data - Banff Park.

Includes Waterfowl Lakes at Elevation 5420

and Mistaya Lakes at Elevation 5450

all on Mistaya River - Tp. 33, Rg. 19, W.5th.

(11) Glacier Lake Storage:

Very little data on Glacier River.

Elevation 4700 - Tp. 34, Rg. 21, W.5th Mer.

The data on other sites on the Brazeau, Baptiste, Clearwater, Ram, etc. which are all tributary to the North Saskatchewan, is rather sketchy; this is especially the case in connection with foundation conditions.

Some overall estimates have been made of the capacity of these sites but until head water storage has been more definitely determined any such estimates are problematical.

It will be evident from the foregoing discussions that there are sufficient potential water power sites in the Province for some time to come. Water power estimates however, depend upon so many unpredictable factors such as cost, foundation conditions, head water storage, proximity and characteristics of the available power load and characteristics of the stream flow, that it is futile and even dangerous to estimate capacities too far ahead of development. It should be realized, therefore, that estimates made of the potential water power in the Province, because of the flashy nature of the flows, are at present merely intelligent guesses, and may materially change from time to time to meet the changing conditions of the controlling factors.

In co-operation with the Power Commission and the Calgary Power Limited an extensive investigation is being carried out along the Athabasca from Lesser Slave Lake which could be used as a reservoir to boost the winter flow of the Athabasca River as far as Fort MacMurray.

Contour maps from aerial surveys have been completed and further investigations are in progress.

The amount of money spent on these surveys to date by the Alberta Government is approximately \$40,000.00.

The Calgary Power Limited at its expense completed the ground control surveys - approximately \$60,000.00.

The affect of a reservoir at Lesser Slave Lake would be to boost the winter flow of the Athabaska River below that point from 2900 c.f.s. to 7500 c.f.s. However, there would be some difficulties of maintaining a winter flow through the Lesser Slave River to the Athabaska River.

A solution will have to be found for these difficulties before any reliable estimates can be made of the project.

The Tershishner Site on the North Saskatchewan River is now being investigated in considerable detail by the Calgary Power Limited.

The best information so far available is that by means of a dam about 240 feet in height it would be possible to create storage of about 250,000 acre feet which would increase the winter flow at Edmonton in a low water year to about 1640 c.f.s. in every low water year and to something like 2500 c.f.s. in a year of normal winter flow.

It is intended to continue power surveys and investigations on the Athabaska to the point where the water power potentials can be assessed within some degree of accuracy.



Bearspaw Dam showing compaction of earth against the transition section.

SECTION (7) PRAIRIE PROVINCES WATER BOARD:

(a) Early History.

The transfer of the Resources from the Dominion to the Provinces was contemplated for many years prior to 1930 when they were actually turned over.

To those familiar with the steams it was not contemplated nor was it considered advisable that the Water Resources should be transferred. However, the many sound arguments against turning over the Water Resources fell on deaf ears at the time and they were ultimately transferred.

(b) In order to prevent disputes and possibly litigation however, a Western Water Board was proposed consisting of representatives of the Dominion Government and the respective Governments of the three Prairie Provinces. A draft agreement was drawn up and presented for consideration to the respective Governments in 1937. No agreement was signed and the matter was dropped until 1944.

(c) In that year, due largely to representations of the Province of Manitoba, the matter of a Board was discussed at an International Conference held in Saskatoon with the result that a new draft was drawn up and presented to the Governments affected.

While the three Provinces showed some interest in such a Board it was apparent that the Dominion was not so interested. The result was a Prairie Provinces Water Board without Dominion representation, for which an agreement was signed by the respective Provinces in January 1946.

The Board, which was pretty much a fact finding board, held several meetings and then proposed a meeting with a number of Committees of the Dominion Government interested in Natural Resources.

(d) This brought the matter of a Water Board to the attention of a number of influential members of the Dominion Government and was the cause of a heated debate in the House of Commons where the Honourable Mr. Glenn, then Minister of Resources threatened that, since the Provinces had set up a Board without inviting the Dominion to participate, the Federal Government was stepping out of the picture. It was charged by the other parties in the House at the time that the Federal Government was seeking an excuse to back down on its promises of Irrigation for the West.

(e) The result of discussions which followed was the inclusion of Dominion Members on a newly constituted Board under a Dominion-Provincial Agreement dated July 28th, 1948.

The function of this Board, now in force, along with other duties is to recommend the best use to be made of interprovincial waters in relation to the associated resources of Manitoba, Saskatchewan and Alberta and to recommend the allocation of water between each such province of streams flowing from one Province into another Province.

(f) One of the first actions of the Board was to recommend for Alberta sufficient water for all projects which had been authorized prior to the formation of the Board or some 2,237,234 acre feet for an area of 1,256,435 acres, and other uses in Alberta. This recommendation was made by the Board and approved by Orders in Council of all parties to the agreement (with the exception of the Province of Saskatchewan) in 1949. The province of Saskatchewan withheld approval for a number of years but did finally approve.

(g) By Orders in Council July, 1951, all parties to the Agreement approved

a similar application made by the province of Saskatchewan for those projects authorized before the formation of the Board.

SECTION (8) APPLICATION FOR SOUTH SASKATCHEWAN PROJECTS:

(a) At a Board meeting held at Regina, September 5th and 6th, 1951, an application was made to the Board for some 960,000 acre feet of water for the South Saskatchewan project.

The Alberta member, in opposing a motion to discuss the application at that time, submitted an alternative to the South Saskatchewan Project (the North Saskatchewan project or the Red Deer Diversion), stating that he was not prepared to discuss any allocation for the former until the latter had been more thoroughly investigated. He believed that as a Board member he was carrying out the functions of the Board in endeavouring to determine the best uses of the water. The result of the meeting was to renew the reservation which had already been made for the project.

(b) A check was made of the material submitted by the Alberta member in support of an alternative and considerable discussion took place between Board members regarding the respective merits of the alternatives but no satisfactory conclusion arrived at.

(c) However, in the meantime the Dominion Government had appointed a Royal Commission on the South Saskatchewan River Project to report as follows:

(1) Whether the economic and social returns to the Canadian people on the investment in the proposed South Saskatchewan River Project (Central Saskatchewan Development) would be commensurate with the cost thereof.

(2) Whether the said Project represents the most profitable and desirable use which can be made of the physical resources involved.

Submissions were made to this Commission by the Provinces of Alberta, Saskatchewan and Manitoba.

(d) The submission by Alberta stressed the advantages of one overall Alberta, Saskatchewan project rather than two separate projects.

The following are from the Alberta report:

“For some time to come and possibly for ever the construction of irrigation facilities should be confined to those areas which can be reached by gravity canals or by low lift pumps where exceptional conditions warrant the use of such pumps.”

“Because of topographic and other features of the Saskatchewan Rivers basin the best or most economical and beneficial uses of the water supplies, so far as irrigation and water power development is concerned, naturally occur in the foothill regions of the drainage basin. This foothill region happens to be in Alberta.”

“Since the Province of Alberta can give no assurance that irrigation development will be confined to 1,721,000 acres then the estimates made for the primary and secondary energy production of the Coteau site is questionable on the basis of water supply alone.”

(e) (1) The Royal Commission held a number of public hearings at which a great many interests were represented and finally reported to the Governor General in Council its findings and recommendations, some of which are as follows:

“the available data, which is by no means complete, indicate that the

said project does not represent the most profitable and desirable use which can be made of the physical resources involved."

Along with other recommendations the following is made:

"Bringing additional land under irrigation in the Saskatchewan River basin by pumping water direct from the river and from existing irrigation canals or extensions thereof."

"The development known as the Red Deer River project including its possible extension into the Province of Saskatchewan."

(e) (2) The Government of Saskatchewan was not pleased with the report and submitted to the Dominion Government strong objections to some of the material and recommendations contained in the report.

(e) (3) One of the matters which was not clear to the Government of Saskatchewan was that of available water supply for the South Saskatchewan Project. Although the Board had made a fairly complete study of the water supply of the South Saskatchewan River, and Saskatchewan had applied for 960,000 acre feet of water for South Saskatchewan project no application had been made for the necessary water for water power purposes.

A meeting was called for May 15th, 1953 to consider Saskatchewan's application for 960,000 acre feet for the South Saskatchewan project. It was unanimously agreed by the Board that a tentative allocation of 960,000 acre feet of water should be made.

The following is from a memorandum prepared by the Alberta member of the Board:

"Although no allocation has been made by the Board for water power purposes only part of the 960,000 acre feet can be put to beneficial use except by the use of a further supply of water for water power purposes and it is known that the intention of the project is to develop water power for pumping and other purposes."

The following is an analysis of the water supply situation on the South Saskatchewan River at the Saskatchewan-Alberta boundary.

Total annual flow available to South Saskatchewan

Project - Ave. Nat. flow 25 years - - - - - 7,100,000 ac. ft.

Annual flow available after deducting 2,100,000 ac.ft.

the best estimate possible for ultimate water uses upstream- - 5,000,000 ac. ft.

Although the above is the case it is the opinion of the Alberta Representative on the Board that allocation of water for the development of water power is not practicable for the following reasons:

First: - The use of water for power development is inferior to its uses for domestic, municipal, industrial and irrigation purposes.

Note: - The above is recognized in the various Irrigation, Water Resources and Water Rights Acts of the Dominion, Provinces and States.

Second: - Because of the very great variation in rate of flow of the interprovincial streams of the Western Provinces from day to day, month to month and year to year, regulation by storage, particularly to increase the winter flow, is necessary for the economical use of water for power purposes and therefore, it is not practicable to assess the benefits of upstream storage for downstream uses equitably by

Provinces. It is, therefore, not practical to allocate water equitably for power purposes.

Third: - In order to guarantee a constant yearly supply of water from the upstream interests to the downstream interests, it is either necessary for the upstream interests to build storage capacity for the complete regulation of the stream or to limit for all time consumptive uses of the upstream water resources.

This the Province of Alberta should avoid.

SECTION (9) WATERTON AND BELLY RIVERS REFERENCE:

The international streams in Southern Alberta are the St. Mary, Milk, Waterton and Belly Rivers. The St. Mary and Milk Rivers are capable of being used for irrigation purposes in both the United States and Canada. The Waterton, and Belly Rivers are capable of being used for irrigation purposes in Canada. However, it is not considered practicable (at least by Canadian engineers), to use the Waterton and Belly Rivers for irrigation purposes in the United States except by diversions through Canada or by a swap of waters.

A St. Mary-Milk River Project was authorized in 1903 by the United States Government and construction commenced in 1906. Prior to 1906 Canada was using considerable water from the St. Mary and Milk Rivers for irrigation purposes and had rights for much larger quantities.

Disputes over the use of the St. Mary and Milk Rivers waters were between Canada and the United States but were finally settled through Article VI of the Boundary Waters Treaty and an order of the International Joint Commission dated October 4th, 1921. These provide for the method of dividing the waters of these two streams between Canada and the United States.

United States interests were not entirely satisfied with the settlement

and have been looking to Canada for many years for additional water supplies.

By 1942, reservoirs had been constructed within the United States to

regulate the United States share of the St. Mary and Milk Rivers. Preliminary surveys were completed in Canada for a project to use, not only the whole of Canada's share of the Milk and St. Mary Rivers, but also all of the flow of the Waterton and Belly Rivers as well and a project, The St. Mary and Milk Rivers Development, was authorized and under construction.

(a) It was not long however before a dispute arose between the United States and Canada with respect to Canada's rights to the flow of the Waterton and Belly Rivers. The following matters were, therefore, referred to the International Joint Commission.

- (1) To investigate and report on the water requirements arising out of the existing dams and other works or projects located in the waters which are of common interest along, across or in the vicinity of the International Boundary line from the Continental Divide in the West to and as far as the Western limit of the St. Mary River drainage basin on the east.
- (2) To report whether in the judgement of the Commission further uses of these waters within their respective boundaries by Canada and the United States would be practicable in the public interests from the points of view of the two Governments.
- (3) Having regard to the reports made under paragraphs 1 and 2 to make

advisory recommendations concerning the apportionment which should be made between Canada and the United States of such of the waters under reference as cross the International Boundary.

(4) To conduct the necessary investigations and prepare a comprehensive plan or plans of mutual advantage to the two Countries for the conservation, control and utilization of the waters under reference in accordance with the recommended apportionment thereof.

The date of the reference is January 12th, 1948.

(b) Joint Canadian and United States Boards were appointed to study the engineering features and accumulate the factual data in connection with the reference all of which are contained in a report dated March 31st, 1950.

With regard to Water Supply the Committee found:

Annual average flow 1913 to 1948 Waterton River - Canadian origin	15,600 ac. ft.
Annual average flow 1913 to 1948 Waterton River - U.S. origin	<u>197,900 ac. ft.</u>
Total ----	213,500 ac. ft.
Annual Average flow 1913 to 1948 Belly River - Canadian origin	nil
Annual Average flow 1913 to 1948 Belly River - U.S. origin	<u>183,300 ac. ft.</u>
Total ----	183,300 ac. ft.
Combined Waterton and Belly Flow - Canadian origin 1913 to 1948	15,600 ac. ft.
Combined Waterton and Belly Flow - U.S. origin	<u>381,200 ac. ft.</u>
Total ----	396,800 ac. ft.

Annual average flow 1927 to 1948 - Canadian origin Waterton R.	15,300 ac. ft.
Annual average flow 1927 to 1948 - U.S. origin Waterton R.	<u>188,800</u> ac. ft.
	Total ----
	204,100
Annual average flow 1927 to 1948 Belly R. - Canadian origin	nil
Annual average flow 1927 to 1948 Belly R. - U.S. origin	<u>174,400</u> ac. ft.
	Total ----
	174,400 ac. ft.
Combined Waterton and Belly Rivers flow - Canadian origin 1927 to 1948	15,300 ac. ft.
Combined Waterton and Belly Rivers flow - U.S. origin	<u>363,200</u> ac. ft.
	Total ----
	378,500 ac. ft.
Average annual flow Belly R. at Mt. View 1911 to 1948	224,500 ac. ft.
Average annual flow Belly R. at Internation Bdy. 1911 to 1948	183,300 ac. ft.
Average annual flow Belly R. at U.I.D. headgate 1911 to 1948	227,300 ac. ft.
Average annual flow Belly R. at Proposed St. M. and M. R. diversion 1911 to 1948	233,900 ac. ft.
Average annual flow Belly R. at Standoff 1911 to 1948	251,100 ac. ft.
Average annual flow Waterton R. International Bdy. 1911 to 1948	197,900 ac. ft.

SUMMARY OF WATER USES:

Belly River:

United I.D. prior to 1948 - - - 36,000 ac. ft. Full development - 51,250 ac. ft.

Mt. View I.D. prior to 1948 - - 6,000 ac. ft. Full development - 6,000 ac. ft.

Leavitt I.D. prior to 1948- - - 1,500 ac. ft. Full development - 7,000 ac. ft.

Aetna I.D. prior to 1948 - - - - - ac. ft. Full development - 13,000 ac. ft.

Other small users to 1948- - - 3,572 ac. ft. Full development - 5,114 ac. ft.

Oldman River

City of Lethbridge to 1948 - - - -	44.2 c.f.s.	Full development -	125 c.f.s.
Other small users to 1948 - - - -	1,154 ac. ft.	Full development -	2,980 ac. ft.
Rip. and other uses to 1948 - - - -	21,710 ac. ft.	Full development -	21,710 ac. ft.
Total to 1948 - - - 65,210 ac. ft. Full development - 98,960 ac. ft.			

Waterton River:

Riparian and other uses

prior to 1948 - - - - 21,710 ac. ft. Full development - 21,710 ac. ft.

Below Waterton Lake

prior to 1948 -

Uses at Waterton Lake

prior to 1948 -	Park needs	Full development	Park needs
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A number of hearings were held by the International Joint Commission in connection with the Reference as well as a number of consultations with advisors from Dominion and Alberta engineers and attorneys, and came to the conclusion that because it was not practicable to divert the Waterton and Belly Rivers on the United States side of the Boundary, Canada should be entitled to all of the flow.

The Canadian Section consider that Alberta's case rests on very strong considerations. There were already large existing uses of the Belly River waters and some also on the Waterton River. There were projects initiated before the date of reference which were practicable and in process of execution which could make effective beneficial use of all waters of both steams.

Nevertheless it might be that, as an act of good neighbourliness and for prompt agreed settlement, Alberta might be disposed to accept something less than her rights as set forth by Canadian Council.

The United States Section of the Commission was asked to consider some such proposal as indicated. Senator Stanley of the American Section, in a letter to A.G.L. McNaughton, expressed the views of the American Section which was an equal diversion of waters which cross the Boundary.

In a nut shell the views of the Canadian Section are as follows:

Under the terms of reference of January 12th, 1948, an allocation should not be to the United States of any part of the waters of the Waterton and Belly Rivers.

The Canadian Section does not think that Canada can be expected to surrender its rights to the use of those waters because of the remote possibility that some of such waters may be diverted at some time in the future, particularly in view of the safeguards provided under Article II of the Boundary Waters Treaty.

The views of the American Section may be summed up about as follows:

There should be an equal apportionment of the waters of the Waterton and Belly Rivers between the two Countries. This would be eminently fair and equitable and strictly in accordance with the pattern hereto established.

Paragraph (3) of the reference directs the Commission, after giving consideration to reports made under paragraphs (1) and (2), to make recommendations regarding apportionment.

If there is any doubt as to intention of paragraph (3) then it is only necessary to refer to paragraph (4).

In the light of the above there can be no doubt regarding the intent of the two Governments to apportion these waters.

As a neighborly gesture the following was submitted to the United States section by the Canadian Section.

Canada through its works on the St. Mary River, (the St. Mary Reservoir, Ridge Reservoir, Verdigris Reservoir and connecting canals) to transport the U.S. share of St. Mary River (high peaks and winter flow) to the Milk River for use in the United States.

Canada through its works (now under construction) to deliver to United States, in addition to the above 45,000 ac. ft. each year in which there is normal flow (1,222,000 ac. ft. the combined flow of Waterton and Belly Rivers as measured at Waterton Park and Mountain View) provided the 45,000 ac. ft. is reduced in years of sub-normal and abnormal flows by four times the percentage by which the annual flow for a particular year is less than or exceeds 1,222,000 ac. ft. and provided further that Canada will not be required to deliver more than 125,000 ac. ft. in any year under the above formulae and not any more than 75,000 ac. ft. of St. Mary River water.

(f) The American Section if they examined this proposal at all certainly did not consider it favourably as indicated in a letter by Senator Stanley to General McNaughton dated January 30th 1953. as follows

"It would provide that when flows are above normal the United States would receive a rapidly accelerating quantity of water. Similarly it would provide that when flows are below normal the United States would receive a rapidly diminishing quantity of water."

"Whenever the combined flows are as low as 75 per cent of normal which occurs one in about three years the United States would receive no water supply at all."

"Whenever the flows are 125 per cent of normal the United States would receive about double the normal quantity. It would also be impracticable to use this water efficiently because the canals and facilities which would be required would have to be of such huge size and capacity that the economic feasibility of any project would be questionable."

In order to make any apportionment of water for a given year it would be necessary to forecast in advance with complete reliability the total annual flows for the coming irrigation season. Because of the characteristics of these streams this would be impossible.

(g) A counter proposal to the Canadian proposal was made by the United States section of the committee dated August 1953, which consists of an exchange of St. Mary River water for one-half the combined Waterton and Belly River waters of United States origin. This water would be diverted at Babb or at a point just south of the International Boundary and either carried by the Milk River back to the United States or by canal to the headwaters of the Marias River and to the Milk River as required for the Marias or Milk River projects.

The plan as worked out is about as follows:

Ann. Ave. flow Waterton River - U.S. origin 1927 to 1948 - - - - - 188,000 ac. ft.

Ann. Ave. flow Belly River - U.S. origin 1927 to 1948 - - - - - 173,900 ac. ft.

Total - - - 361,900 ac. ft.

One-half to U.S. and one-half to Canada 1927 to 1948 - - - - - 180,900 ac. ft.
Water diverted to U.S. from Canada's share St. Mary River - - -
1927 to 1948
in exchange for 180,900 ac. ft. claimed by U.S. as its share
of the Waterton and Belly Rivers - - - - - 172,400 ac. ft.
U.S. Share of St. Mary River 1927 to 1948 - - - - - - - - - 163,500 ac. ft.
Total diverted from St. Mary River by U.S. - - - - - - - - - 335,900 ac. ft.

NOTE: - The above is the U.S. requirement for the Milk River project, some 124,000 acres and for the Marias project some 53,000 to 69,000 acres depending upon diversion plan adopted.

An examination of the counter proposal indicated that it was worthy of investigation and may be a basis for settlement between the two countries

The amount of 335,900 acre feet is a large portion of the St. Mary River at the Boundary or some 57 per cent and would require almost 100,000 acre feet from Canada's share of the stream or about 29 per cent of that share.

A diversion of this kind would seriously affect Canada's plan of irrigation development. However, in order to settle the matter Canada might be prepared to allow the United States to divert at Babb practically all of its share of the St. Mary River and say up to 25 per cent of the Canadian share.

Canada with the consent of Alberta has already agreed as a neighbourly gesture to let the U.S. have some of our water and further agreed to make such water available at Babb as a matter of convenience to the United States.

Surely now Canada can do as she pleases with her share of the St.

Mary River even to letting the U.S. have as much as 25 per cent of her share of the St. Mary River. This shouldn't endanger Canada's rights under the 1909 treaty.

(e) However, the following engineering committee has been appointed by the Commission to analyse the various proposals and counter proposals made and endeavour to come out with a satisfactory solution.

Canadian Section:

G. L. Mackenzie, Chief Engineer, P.F.R.A., Regina;

W. L. Foss, Supervising Construction Engineer, P.F.R.A., Lethbridge;

Ben Russell, Director of Water Resources, Edmonton.

United Section:

C. T. Judah, Regional Planning Engineer, U.S.B.R., Billings, Montana;

F. E. Buck, State Engineer Montana, Helena, Montana;

H. S. Riesbol, Asst. Chief Hydrologist, U.S.B.R., Denver, Colorado.

SECTION (10) WATER STABILIZATION PROJECTS IN PROVINCE:

Water stabilization projects are those that have been built in the central and northern part of the Province in a co-operative effort between the Water Resources Office, the Department of Lands and Forests and Ducks Unlimited. They consist for the most part of small structures placed in the outlets of our major lakes. Pipes are inserted through the dams to maintain steady flow in the outlet creeks. These projects have a definite water conservation value as well as furnishing a habitat for fish and game.

A total of twenty-nine projects have been built since 1946 and the average cost of the projects is about \$4,000.00 (excluding supervision.) The costs have been

apportioned between Ducks Unlimited and the Government of Alberta on the basis of maximum benefit. Those lakes that are essentially water fowl projects are separated from those that are primarily for fish propagation. The cost of the first named category are divided two-thirds to Ducks Unlimited and one-third to the Province and in the second named category the division of costs is reversed.

The largest project is the Heart River diversion and in the statistics which follow, this scheme has been separated as its magnitude sets it apart from the others which are of modest dimensions.

Ducks Unlimited have constructed, independently, a number of projects in the drought area which are essentially water stabilization projects.

Expenditures by Water Stabilization Committee

For the Province of Alberta

1946 - Burntstick Lake	\$ 3,188.66
1947 - Calling Lake	4,418.35
1948 - Fawcett, Horse, Lac La Nonne and Utikuma Lakes	11,214.04
1949 - Albright, Anderson, Manawan, Sturgeon and Amisk Lakes	10,864.72
1950 - Shoal and Thunder Lakes	4,416.72
1951 - Armstrong, Moose, Sinclair and Lac Ste Anne	11,573.68
1951 - Rock Island Lake	2,500.00
1952 - Whitefish Lake	2,817.61
1952 - Moore and Tucker Lakes (near Bonnyville) and Greys Lake (Hemaruka), Elkwater (near Medicine Hat)	15,400.00
1953 - Norberg and Bunder Lakes	8,000.00
	\$ 74,393.78

Heart River Project:

1949 - 52	Total	\$ 210,000.00
From Ducks Unlimited		<u>20,000.00</u>
Cost to Province		\$ 190,000.00

Estimate storage in the above projects is 250,000 acre feet

Storage Heart River - - - - - 100,000 acre feet

Total - - - - - 350,000 acre feet

Plans for 1954:

For the year 1954 there is a decided possibility that a large dam will be built in the outlet to Lac La Biche. Fisheries experts report a serious loss of fish because of an oxygen shortage in the lake water. This has resulted in a shortage of mink food and as mink pelting is one of the principal industries of this area the outlook for the industry is rather gloomy. It is believed that if the lake level is raised three feet it will retain a large amount of fresh water in the lake and reduce the fish loss. A creosoted timber dam 350 feet in length will cost \$20,000.00. The same type of dam in reinforced concrete would cost about double the above amount. A 50 foot central section of the dam would be flash-board controlled.

Before construction can be proposed it will be necessary to prepare a map of the lake to determine the effect of the raising of the lake level on private property.

It has been the experience of the Water Resources Office that once a dam has been built in the outlet to a lake it is forever held responsible for any

changes in lake levels even though the changes may be entirely due to natural phenomenon.

Benefits From Water Stabilization:

- (1) Healthy lake levels.
- (2) Perennial flow restored in streams.
- (3) Increased fish and wild fowl production.
- (4) Some reduction in flooding along nearby waterways.
- (5) Recreational benefits.

One of the long range objectives of the program is to halt encroachment on our few remaining lakes. By establishing relatively high levels it is hoped that buildings and farm operations will be kept out of the areas affected by fluctuations in the lake levels.

In the past ten years there has been a decided increase in the building of lakeshore cottages. Pigeon Lake is an example of this tendency which has been partly caused by an increase in the amount of leisure time of most people. Our lakes are a natural focal point for boating, swimming and fishing and should be preserved for future generations of our citizens. In addition to this, our lakes are the cheapest storage sites available.

SECTION 11 DRAINAGE:

Drainage of lands in Alberta has been effected by one or more of the following methods:

(1) Common Law Drainage:

An innumerable number of small farm ditches have been built by individuals to improve their lands and these operations have for the most part gone

unchallenged. The summation of all these drainage ditches has in some instances caused hardship to individuals lower down of the drainageways. However, these small operations are as much a part of the business of exploiting the fertility of the land as the cutting down of our forests.

(2) Municipal Road Ditches:

Municipalities have authority under the Municipal Districts Act to build drains to remove ponded water from road allowances and contiguous areas and assess back the costs on a basis of benefit.

(3) Highway Ditches:

The construction of highways makes it imperative that standing water on road allowances be drained to nearby watercourses.

(4) Dominion Reclamation Act:

Many drainage projects were surveyed by engineers of the Reclamation Service (Dept. of Interior). Homesteaders were able to purchase such lands at a very nominal price.

(5) Private Ditches Act:

This Act provides for the construction of ditches by mutual consent of farmers under the aegis of the Municipal Districts. This Act has never been very effective as it is difficult to secure unanimity of opinion among the land owners.

(6) The Drainage Districts Act:

This Act was passed by the Alberta Legislature in 1921 and revised from time to time. It is the only method whereby larger areas may be legally drained and the costs assessed on a basis of benefit. In common with other drainage it is essential that the main drain end in a sufficient outlet. Briefly stated the procedure

for establishment of a drainage district is as follows:

- (a) A petition is circulated among the land owners to cover the area that requires the drainage.
- (b) On receipt of the petition an engineer of the Water Resources Office examines the proposal to see if it is in the public interest.
- (c) A map is prepared showing the area for which signatures have been received and the relation of this area to existing water courses is studied.
- (d) Signatures are required covering at least 75% of the area mapped out as constituting the District.
- (e) The boundaries of the District are finally adopted and an order of the Minister establishes the District.
- (f) A formal vote is taken by secret ballot to set up the District as defined by (e).
- (g) Officers of the District are elected by ballot and a Secretary-Treasurer appointed.
- (h) An assessment roll is prepared to establish drainage rates.
- (i) Right of way may be obtained from non-signers by incorporating their lands into the District or by outright purchase.
- (j) Collection of rates may be enforced by Court Action.
- (k) The Act provides that a District may sell debentures or make other arrangements to finance the construction of necessary works. The Drainage Council of the Alberta Government authorize such borrowings.

Drainage Districts in Operation in 1953

The following table indicates the established Drainage Districts with certain significant data in each case:

District	Gross Area (acres)	Area in Sloughs (acres)	Cost \$	Contribution by Government \$	
Holden	50,560	12,340	202,123.00	73,678.26	Paid up debentures - 1951
Daysland	74,720	15,000	308,417.00	112,839.14	ditto
Dickson	15,360	2,880	45,650.00	13,800.00	
Manawan	10,845	3,000	40,000.00	25,000.00	The Manawan District was extended in 1953. Final figures not yet available.
Cygnet Lake	4,200	4,000	4,500.00	To re-build Engineering Assistance - -	-Re-built in 1950. Original ditch build by C.P.R. in 1911. C.P.R. donated \$1,500.00 to rebuild ditch in 1950.
Cameron	2,600	1,000	12,000.00	4,000 (loan)	Commenced 1953.

Bearhills Lake (now being formed)

Some sixty drainage problems were investigated in 1953 and on some of these problems the investigations are continuing. These problems have to be studied very carefully to see whether they are in the public interest.

SECTION (12) DRAINAGE PROBLEMS REFERRED TO THE WATER RESOURCES

OFFICE UNDER SEC. 191 OF THE MUNICIPAL DISTRICTS

OFFICES:

Many farmers from time to time feel that they have a grievance against their Municipalities and protest that they are receiving more water than would normally flow across their lands, because of road ditches interfering with normal flow. Some of these problems are very involved and can lead to serious disagreement.

Section 191 of the Municipal Districts Act provides the procedure that is to be followed in seeking a solution of these problems. The procedure is as follows:

- (1) The farmer officially notifies his Municipal District of his grievance.
- (2) The farmer is asked to attend a meeting of Council to talk over the problem.
- (3) A committee of at least three members of Council investigate the problem.
- (4) A solution is sought by the Committee in consultation with the farmer.
- (5) If a solution is not agreed upon an engineer of the Water Resources is asked to investigate the problem and suggest a solution.
- (6) If the Municipal District is at fault then an order is issued by the Minister of Municipal Affairs along the lines suggested by the Engineer.
- (7) If the farmer is still not satisfied he may then commence action against his Municipal District.

During 1953 about 80 disputes were investigated by engineers of the Water Resources Office under Sec. 191. Some Municipal Districts such as Morinville, Westlock and Leduc have more of these problems than other districts because of the flat terrain and highly improved farms.

Extraordinary rainfall in July resulted in a number of complaints being received under Sec. 191. Considerable pondage and flooding of farm lands occurred.

In the Peace River District there has been considerable study made of problems arising from road ditch drainage. Water flowing down from the hills is intersected by road ditches and although the water is led to nearby watercourses there is always a question as to the division of the water and the constant claim

that the flow in certain localities has been augmented or accelerated by the road ditches. Erosion of farm lands is a constant hazard in the Peace River area.

Because of their specialized knowledge of water problems the Water Resources Office co-operates with other government departments and other agencies in arbitrating drainage disputes.

In some instances infractions of Section 6 of the Water Resources Act have to be investigated. This section of the Act has to do with illegal interference with natural flow in streams or watercourses. If the obstructions are not removed on request then a Ministerial Order is issued demanding the removal. Penalties can be invoked for further failure to comply with the Order of the Minister.

SECTION (13) LEGISLATION TO DO WITH WATER RESOURCES:

(a) The following is a list of the Acts and Regulations now administered by the Department of Water Resources.

Water Resources Act

Ground Water Control Act

Irrigation District Act

Irrigation Project Act

Drainage District Act

Private Ditches Act

United Irrigation Districts Act

An Act for the Relief of the United Irrigation District

Eastern Irrigation Districts Act

Lethbridge Northern Colonization Act

New West Irrigation District Colonization Act

St. Mary and Milk Rivers Development Act

United Irrigation District Colonization Act

Western Irrigation District Act

Water Users Districts Act

Crop Payment (Irrigated Land Sales) Act

The important principals embodied in the Water Resources Act are as follows:

(b), (c) The first principal is that ownership of water is vested in the Crown. That is, no one has the right to take, impound, divert water or obstruct the flow of water unless permitted to do so under the provisions of the Act and Regulations. The second principal is that no grant of water by the Crown gives the grantee any exclusive or perpetual right in any surface waters or in the lands forming the beds or shores of such waters. The third paragraph is that water is granted for beneficial use only, and only for so long as it is used beneficially. Any grant for the use of water may be cancelled for non-use or amended, from time to time, to meet the requirements of beneficial use.

The purpose of the Irrigation Districts Act is to provide machinery for would be irrigationists to get together and construct the necessary facilities with which to supply the necessary water supply. Owners of 75 per cent of the lands included in a feasible irrigation project may by petition, to the Minister in Charge of Water Resources, be organized for the purpose with all of the necessary powers to borrow the necessary money and to construct and operate an irrigation project.

The purpose of the Drainage Act is similar to the above for the construction and operation of a drainage project.

The United Irrigation District which was organized under the provisions of the Irrigation Districts Act and for the purposes of raising a sum of \$645,000.00 for construction purposes by debentures guaranteed by the Province came to the end of its resources in the early thirties. It therefore became expedient for the Alberta Government which guaranteed the bonds to come to the relief of the district and for that purpose the following Legislation was enacted;

The United Irrigation Districts Act of 1934 and

An Act for the Relief of the United Irrigation District

of April 23, 1935.

The United Irrigation Districts Act makes special provision for the distribution of the proceeds of the sale of land situate in a municipal district which is sold as a result of rate enforcement proceedings under the Irrigation Districts Act taken by the United Irrigation District.

If the proceeds of sale and any revenue from a parcel of land received by the Irrigation District on account of rentals or otherwise is insufficient to pay in full the claims of the Irrigation District for rates and the Municipal District for taxes the same are to be distributed rateably after payment of the costs and expenses incurred in the rate enforcement proceedings and the moneys received by the irrigation district and the municipal district are deemed to be received on account of rates and taxes as the case may be and to be subject to any change affecting those rates or taxes as the case may be.

The Act for the Relief of the United Irrigation District provides relief

from any obligation to make the annual contribution to the sinking fund in respect of the said debenture issue in each of the years 1934, 1935 and 1936 or to pay the interest payable on the said debentures in each of the said years, and also relief of any obligation or liability to reimburse the Government for sums paid by the Government under its guarantees of the said debenture issue to the extent that the said sinking fund will be sufficient to redeem the said debentures by reason of the operation of the Act.

By agreement dated March 15th, 1935, between the Canadian Pacific Railway Company, the Board of Trustees of the Eastern Irrigation District, which was set up under the provisions of the Irrigation Districts Act at that time, for the purpose, the above named Company transferred to the Board the entire undertaking and works (as works are defined by the Irrigation Act), comprised in the Eastern Section of the Irrigation system of the Railway Company. The Eastern Irrigation District Act. The Agreement referred to is by the Act ratified and confirmed and made legally binding and formed an integral part of the Act.

The Act vests certain property in the Board, substitutes the Board as to certain rights and liabilities and substitutes the Board for the Company in the matter of all Water Agreements entered into by the Company, and binds the Crown, in the right of the Province, with respect to any right, obligation or liability under any right or license granted by the Crown for use of water from the Bow River and any rights, liability, or obligation relating to the crossing of road allowances by irrigation canals, ditches, or other works. The Board of the District, in addition to the powers conferred by the Irrigation Districts Act, is given further powers as are requisite for the conduct of the affairs and business

of the District as may be prescribed, from time to time, by the Minister.

With the approval of the Irrigation Council the Board is empowered, by Bylaw, to provide for the following:

- (a) readjustment of the terms of any agreement for sale of any land made by the Company;
- (b) for the compromise of any claim of the Board as to any money payable under any such agreement of sale;
- (c) for the substitution of new contracts for outstanding contracts;
- (d) disposition of lands.

Notwithstanding the provisions of Section 22 and 23 of the Irrigation Districts Act the Board may, with the consent of the Irrigation Council, employ Board Members in reclassifying irrigable lands.

Under the provisions of the Act Section 24 of the Irrigation Districts Act is not applicable.

Under the provision of the Act Section 26 of the Irrigation Districts Act is not applicable, but Section 21 of the Act is in lieu thereof.

Section 21 of the Act provides for the appointment of the General Manager with powers and duties as follows:

- (a) the powers and duties as imposed upon a Secretary-Treasurer under provisions of the Irrigation Districts Act;
- (b) appointment of an engineer and other employees at salaries approved by Board, prescribing of duties and suspension or dismissal of employees;
- (c) Supervise and be responsible to Board for affairs of District;

- (d) report to Board and furnish Board with any information regarding affairs and business of Districts;
- (e) give effect to recommendations and directions of Board.

The Board shall not suspend or dismiss General Manager without approval of Irrigation Council.

The Board shall not alter remuneration of General Manager without his consent or the remuneration of employees without consent of General Manager or Irrigation Council.

Disputes between Board and General Manager to be referred to Irrigation Council. .

Section 120 of the Irrigation Districts Act not applicable but Section 25 of the Act enacted in lieu thereof.

The Minister, with the approval of the Irrigation Council, is given powers to give directions regarding the affairs of the District and to dismiss the General Manager or Board or any member of Board who refuses to carry out directions of Minister or for any nonfeasance, misfeasance or malfeasance acts.

Transfers, assignments or other instruments made by persons interested in any land of District except assignments, for the benefit of conditions under the provision of The Bankruptcy Act and testamentary instruments shall have no affect unless approved by Irrigation Council, and the Irrigation Council shall not approve unless satisfied that assignee competent and capable farmer; consideration for transfer not excessive.

The Private Ditches Act of 1922 provides the necessary machinery

for a group of land owners who have a common drainage problem to organize for the purpose of solving such problem on a cooperative basis with the Municipality or Municipalities within which the problem arises.

Any owner or owners can commence proceedings by presenting the problem to the Municipal Council which by resolution can proceed with the solution first by agreement with the Municipal council setting up a board to assess the lands to be benefitted and third by apportioning the cost of construction to the lands benefitted in proportion to benefits received.

So long as the construction cost, as estimated by an engineer appointed for the purpose does not exceed \$5,000.00 and that the scheme is feasible and practicable such works can be proceeded with and where necessary the Municipal Council may borrow money for the purpose, charging all costs back to the lands benefitted and collecting it back in the form of taxes. Any ditch must be continued to a sufficient outlet and authorization given under the Water Resources Act.

The purpose of the Lethbridge Northern Colonization Act is to vest in a Manager, power to acquire, hold lands and securities, and other real and personal property of every description of the District and to sell any lands of the District at such price and upon such terms and conditions as may be from time to time prescribed by the Lieutenant Governor-in-Council.

The Act provides, subject to any Order in Council, for the functions, duties and powers of the Manager.

The purpose of the United Irrigation Districts Colonization Act is similar to that of the Lethbridge Northern District Act. It provides that the Board of the District shall transfer to a Colonization Manager:

- (a) all lands which have become vested in the Board under the provisions of The Irrigation Districts Act and which have been offered for sale by public auction and have not been sold; and
- (b) all lands in the District which may from time to time be vested in the Board under the provisions of The Irrigation Districts Act save and except any lands which are owned by the Board and which are required in connection with the operation of the District.

The Act provides subject to Order in Council, the function, duties and powers of the Manager.

The purpose of The Water Users Districts Act is to provide the machinery for water users within a District to form an association; operation distribution to lands of the association or for any other purpose, subject to the approval of the Board, Corporation, or person supplying water to the association or District.

It provides for the election of Managers, Registration of the Association with the Provincial Secretary, election of officers, Regulations, and all other provision necessary for the formation, operation and dissolution pertinent to such organizations.

The purpose of The New West Irrigation District Colonization Act is similar to the above Colonization Acts. However, since the New West District has recently been dissolved the Act is not of much further value.

The purpose of the St. Mary and Milk Rivers Development Act is:

First: - to ratify an agreement between the Province of Alberta and the Alberta Railway and Irrigation Company and the Canadian Pacific

Railway Company which from March 27th, 1946 rests the entire undertaking of the Canadian Pacific Railway Company in His Majesty in the Right of the Province of Alberta.

Under the Provisions of Part I of the Act the Province is empowered:

- (a) to maintain and operate the undertaking and works;
- (b) to alter, improve, extend and add to the undertaking and works;
- (c) to seek transfer or otherwise dispose of the undertaking, etc. etc. to any Irrigation District, Municipality or other body authorized to acquire and operate the same;
- (d) to enter into any agreement approved by the Lieutenant Governor in Council with the Government of Canada involving or affecting in any way the undertaking and works;
- (e) to do anything necessary or incidental to the exercise of the foregoing powers.

Second: - For the appointment of a Manager with such powers and duties as are assigned to him by the Lieutenant Governor in Council and by this Act and to be paid such salary as is fixed from time to time by the Lieutenant Governor in Council. The Manager is given similar powers and capacity as the Trustees of an Irrigation District.

The power and duties of the Manager are prescribed in some detail in the Act.

Although many provisions of the Irrigation Districts Act apply to the project method of including lands, they differ in that those lands to be included are those to which the Manager becomes legally obliged to supply water. The Minister

at his discretion however, may include any lands or exclude any lands on the request of the Manager, duly approved by the Irrigation Council.

The Act further provides the necessary provision for the Manager to alter or modify any works, prevent soil drifting make regulations and rules, and bylaws consistent with the objects of the Act for the equitable distribution of water for the disposal of surplus waters and for cutting off and stopping the supply of water to any parcel of land in arrears for rates. The Act also provides the Manager with authority to borrow in any year an amount not exceeding that of the levies for the year.

Other provisions in the Act are for the recovery of water rates, apportionment of water rates, expropriation of lands, and other necessary matters.

Part II of the Act provides for the appointment of a Colonization Manager with powers and duties similar to a colonization manager for an irrigation district.

The Western Irrigation District Act was simply an Act to ratify an agreement whereby the C.P. Railway relinquished its irrigation project to an organization of farmers. The Act became law on March 24th, 1944, and a sum of money in the amount of \$200,000, immediately made available to the Board of the Western Irrigation District. A further payment of \$100,000 was made on April 1st, 1946. The money was to be used for maintenance and operation of the District. Schedules forming part of the Act set forth the area of land included in the District and the water rights in good standing. Mineral rights were not transferred to the Board.

LEGISLATION RE WATER RESOURCES:

The three principal Acts administered by the Water Resources Office are the Water Resources Act, The Irrigation Districts Act and the Drainage Districts Act. All of these Acts have been revised in the past two years for the Revised Statutes. The Water Resources Office has co-operated with the Attorney General's Office in checking over legislation and bringing it up to date.

A new Part IV has been added to the Water Resources Act. Briefly stated this part of the Act will permit the implementation by the Minister (under advisement of the Legislative Council) of works and undertakings which are considered to be in the public interest. These works and undertakings have to do with Drainage, Irrigation, Water Power, Stream Control and Water Supply. The new part of the Act will permit the Minister to enter into agreement with responsible organization to implement projects of the type listed above. All of the powers required to enter private land, to purchase or expropriate Right of Way and to let contracts are provided for in the new part of the Act. In the past the activities of the Water Resources Office have been confined to issuing permission to properly constituted bodies to construct works and undertakings. The new Part IV of the Act will permit the Minister to deal directly with water problems that concern the public interest.

The principal change in the Drainage Districts Act and the Irrigation Districts Act requires a 75% sign up of land owners who seek drainage or irrigation in a defined area. The previous requirement of 50% was considered to be rather small. It is felt that a district has a much better chance of ultimate success where the greater majority get behind the project at its inception.

SECTION (14) GROUND WATER CONTROL ACT

The objective of this Act which was passed by the Legislature in 1953 is to prevent the wastage of underground water and water pressure in the aquifers.

Regulations were drafted and are now officially adopted requiring the registration of all those who drill for water on lands not necessarily their own.

It is now proposed to register all water boring operators and to require proper control of water flows obtained from underground sources.

SECTION (15) PRairie FARM REHABILITATION ACT

In 1935 the Department of Agriculture of the Dominion Government embarked on a long range program of water conservation to relieve the serious drought conditions in the southern plains region, (Palliser Triangle).

The Prairie Farm Rehabilitation Office in Regina has given financial assistance not only to small farm developments, but also to much larger projects such as the St. Mary and Milk River Development and the Bow River Project in Alberta.

The financial assistance to small water development projects is based on a rate of four and one-half cents per cubic yard of earth moved plus the cost of construction materials up to the following limits.

Dugouts - \$125.00

Stockwatering Dams - 150.00

Small Irrigation Projects - 350.00

Since the inception of the program up to March 31st, 1953, the payments for small projects is as follows in Alberta:

	DRAINTAGE		STOCKWATERING DAMS		IRRIGATION SCHEMES		TOTALS	
	Financial		Financial		Financial		Financial	
	Projects Paid	Assistance Paid	Projects Paid	Assistance Paid	Projects Paid	Assistance Paid	Projects Paid	Assistance Paid
Individual	2,794	289,412.55	1,871	171,775.29	834	192,159.58	5,499	653,347.42
Neigh. & Comm.	27	7,729.34	42	27,018.37	17	12,275.89	86	47,023.60
Total	2,871	297,141.89	1,913	198,793.66	851	204,435.47	5,585	700,371.02

COMMUNITY PROJECTS:

In cases where farmers form a Water Users' Association with the intention of storing and utilizing water on a community basis the P.F.R.A. will cooperate with the group. Rural Municipalities, having the same objectives as the Water Users' Association, are also included under this scheme.

Provided that the proposed project is feasible from all aspects the Government of Canada may assume the cost of the capital works involved. On irrigation projects this does not include the cost of the distribution system for irrigating. The Province concerned or the Water Users' Association usually undertakes this work.

In Alberta six projects were completed in 1952 and one project at Rough Meadow Reservoir remains to be completed.

The most recent additions to the Community projects are as follows:

Name of Project	Ref. No.	Location	Type of Project	Com- pleted	Irr. Ac.	Stor. Ac. Ft.	Cap Costs
Reid Hill	53	Vulcan	Irrigation	1952	1,000	700	8,866.00
Wheatacre #2	54	Rockyford	Irrigation	1952	---	---	4,744.00
Esther Flood Irrigation	55	Macklin	Irrigation	1952	4,000	5,000	4,592.00
MacKay Dam	56	Walsh	Irrigation	1952	600	300	9,600.00

Meadow Creek Dam	57	Claresholm	Irrigation	1952	1,500	---	5,630,00
Cowley Community	58	Cowley	Irrigation	1952	750	---	4,666.00
Rough Meadow Reservoir		Coronation	Irrigation	1952	3,200	---	2,471.00

(The projects built in former years were listed in entirely in the 1952-53 report.)

Major Projects:

Assistance given to major projects in Alberta to March 31st, 1953:

Name of Project	Location	Type of Project	Completed	Irr.Ac.	Ac.Ft.	Stor. Cap.	Costs
Bow River	Medicine Hat	Irrigation	Incomplete	235,000	408,862		
(a) Purchase of Canada Land & Irrigation Company							2,353,182
(b) Development & Construction							8,160,794
St. Mary	Lethbridge	Irrigation	Incomplete	519,000	320,000	7,705,686	
Belly River Diversion	Lethbridge	Irrigation	1950	---	---		53,901

NOTE: - All of the above figures have been increased during the active construction season of 1953.

For various reasons the small water development program is slackening off. A comparison is 1951-52 and 1952-53 Annual Reports of P.F.R.A. shows only fifty-three projects built in the intervening period - (Alberta).

SECTION (16) OTHER IRRIGATION DISTRICTS

(1) TABER IRRIGATION DISTRICT

The investigational surveys and the preliminary organization work were carried out immediately preceding and during the first and second years of World War I. Construction works was carried out immediately following the declaration of peace and irrigation operations were commenced in 1921.

The original area of the organized district included 17,000 irrigable acres and an additional area of 4,660 irrigable acres was added in 1929. Further

extensions are now under consideration which will include areas developed for irrigations by the St. Mary and Milk Rivers Development. The original district works were constructed at a cost of \$272,000 which on the basin of the 17,000 irrigable acres included in the project was equal to \$16.00 per irrigable acre. The cost of the works required for the 4,660 acre addition was financed by the sale of a block of land which had been purchased by the district from the Dominion Government.

The district received its water supply through the works of the ~~C.P. & I.~~ project which was carried by the Canadian Pacific Railway Company at the time the Taber district was organized and its works constructed. The agreement between the Canadian Pacific Railway Company and the Taber district concerning the delivery of irrigation water, stipulated an annual delivery of 34,000 acre feet of water to the Taber district at a cost of 50 cents per acre foot.

The Taber district has progressed steadily since the commencement of irrigation operations. Although numerous difficulties were experienced during the change over period from dry farming methods to those of irrigated farming and again during the depression period the rate payers, with very few exceptions managed to retain their holdings intact and the district has been able to discharge its obligations without any major concessions from its bond holders or the Provincial Government. The district is now well established in growing specialized crops which produce good returns with irrigation and which are free from the competition of crop grown under dry land farming conditions.

(2) THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT

The Lethbridge Northern Irrigation District comprises an irregular

tract of bench land on the north side of the Oldman River, which contains a gross area of about 230,000 acres extending from Turin on the East to MacLeod on the West. Investigational surveys to determine the general possibility of diverting water from the Oldman River to serve the area deserving irrigation, followed by detail surveys to determine the specific land area which would be suitable for irrigation were carried out by the Department of the Interior of the Dominion Government in the years 1912 to 1915.

An Irrigation District was erected under the Irrigation Districts Act of Alberta in October 1919. A bond issue guaranteed by the Provincial Government in the sum of \$5,400,000 was sold in 1921 to provide funds for the construction of the necessary works. Construction was completed in the spring of 1923, but commencement of irrigation was delayed until 1924 by damage to the land works from a flood in the Oldman River.

On the basis of the original area of 104,590 acres which was classified as irrigable land, the necessary annual charges to meet bond interest and operation costs were found to total \$5.25 per irrigable acre. It soon became apparent that farmers could not pay these rates and adjustments in charges would be necessary if the project was to be successful. In the period between the commencement of irrigation operations in 1924 and 1936 three inquiries were instituted by the Provincial Government to determine a fair per acre cost which could be net by rate payers. Through the findings of the investigational bodies appointed by the Provincial Government the Capital charges were successively reduced from the original figure of \$55.00 per irrigable acre to an average figure of \$17.00 per irrigable acre resulting from the recommendations of the Ewing

Commission in 1936. In spite of the economic adjustments which are instituted however, the district experienced difficulties over an extended period and it was not until the World War II period when markets improved and specialized irrigation crops became in greater demand that the district made any real progress. By the end of 1952, 90 per cent of the water contracts representing the irrigation capital indebtedness have been paid in full and only one per cent of the contract had less than 25 per cent of its capital debt discharged.

(3) UNITED IRRIGATION DISTRICT

The United Irrigation District includes the area between the Belly and Waterton Rivers north of the third tier of sections in Township 3, Range 27 West of the 4th Meridian. The district contains approximately 63,000 acres of which 34,000 acres are classified as irrigable. The land comprising the present district were originally organized as two districts, the south operation was known as the United District while the adjoining area to the north was known as the Lone Rock District.

In 1919 the Dominion Government carried out surveys for the irrigation of the two original districts by a diversion from the Belly River. These surveys indicated that it was more practicable to serve the lands of the two districts as one unit rather than as divided into two units and shortly afterwards the Lone Rock District was dissolved and the boundaries of the United Districts were extended to take in the lands of the Lone Rock District.

In 1922 the Government of Alberta guaranteed the repayment of a \$550,000 debentures issue and construction of the necessary works was carried out and completed to enable the commencement of irrigation in 1924.

Probably on account of this district being close to the mountains real dry seasons are not as frequently experienced as in the irrigated area located farther east. For this reason irrigation in the United District appears to be considered more as an insurance against possible drought conditions rather than as an annual necessary operation to obtain satisfactory crops. This situation has resulted in poor progress in so far as development in irrigation farming are concerned. In recent years there have been cases where rate payers have made a complete change from dry farming methods and crops to the practice of irrigation and the growing of specialized crops. In other cases irrigation is being used to increase the yields of fodder crops. ~~though possibly the~~ the most general use throughout the district for the irrigation water is for the purpose of providing a year round domestic water supply by filling large dug outs.

(4) MAGRATH IRRIGATION DISTRICT

The Magrath District is located in Township 5 and 6 Ranges 22 and 23 West 4th Meridian and includes a total area of 17 942 acres. Of this area approximately 7,000 acres are classified as irrigable lands and they are served with irrigation water from the main canal of the system presently designated as the St. Mary-Milk River Development. The irrigable lands of the district include 2,000 acres in and around the Town of Magrath which were served by the original works of the A.R. and I. system. These lands first irrigated in 1901 and constituted the first extensive area to be irrigated in the province.

The present district was erected under the authority of the Irrigation Districts Act of Alberta. The preliminary surveys and investigations were carried out by the Reclamation Service of the Dominion Government and the construction

of the project works was carried out under the direction of the Canadian Pacific Railway Company. The necessary financing to cover the costs of the required new works and the delivery of irrigation water to the district, was carried out by an agreement between the district and the Railway Company whereby the Company accepted a District debenture issue in the sum of \$200,000.

In the area close to the town of Magrath where the lands have been served with irrigation since 1901, irrigation farming methods are well established and profitable crops such as sugar beets and crops for cannery processing are grown. The areas which were brought under irrigation for the first time in 1927, however, include rolling lands and steeper slopes than in the case of the original lands, and generally speaking, the crop plans have been united to hay and grain. In these new areas the rate payers have experienced difficulties in meeting their obligations.

In the portion of the district to the north and northwest of the town of Magrath, seepage and alkali problems have developed to the extent that some rate payers and district officials are concerned as to the extent of the damage lands. A study of the conditions has been undertaken by the Drainage Branch of the P.F.R.A. and feasible remedial measures may be found to relaim damaged lands.

(5) NEW WEST IRRIGATION DISTRICT

The New West District consists of a block of forty eight quarter sections of lands situated in the west half of township 14, range 14, West of the 4th Meridian. The district had an overall area of 7,680 acres of which 4,501 acres have been classified as irrigable.

The district was organized and erected as an irrigation district in 1922,

the canals and other works were constructed in 1923 and irrigation was commenced in 1924. On account of being required to purchase water from the C.L. and I Company the annual charges covering every thing connected with the delivery of water to the land parcels of the district amounted to \$4.55 per irrigable acre. The rate payers were unable to pay the necessary rates any by 1931, all but two district land owners had lost their holding through rate enforcement proceedings. The district carried on with assistance from the Provincial Government under a rental base arrangement with the occupants of the lands. In 1953 the district was as an Irrigation District and the lands and works were absorbed by the P.F.R.A. as a part of the Bow River Projects.

(6) RAYMOND IRRIGATION DISTRICT

The Raymond Irrigation District was erected in 1925 as an irrigation district. It comprises 15,129 irrigable acres in Township 6 Range 19, 20, and 21 West of the 4th Meridian. Of this area 8,688 acres were already under water agreement as part of the original A.R. & I. Project and works were constructed within the district to serve in additional 6,441 acres of new lands.

The A.R. and I Company in consideration of a payment of \$160,000 agreed to deliver 40 c.f.s. of water during the irrigation season, to district headgates constructed and maintained at suitable points along the Company's canal. The district agreed to maintain and operate all works within the boundaries and to assume the Company's obligations for the maintaince and operation of all works therein.

The District's arrangement with its rate payers is to supply water at headgates along the supply and from these points the rate payers carry out

the distribution of water to the various land parcels.

(7) MOUNTAIN VIEW IRRIGATION DISTRICT

The Mountain View Irrigation District comprises 3,500 acres of irrigable lands in Township 2 and 3, Range 27 and 28, West of the 4th Meridian located between Mami Creek and the Belly River. The irrigable lands located in Township 3 have a regular even surface and are suitable for the irrigation of grain and mixed crops. In Township 2, however, the irrigable lands include areas which are rolling and steep, and crops on these lands are almost entirely limited to grasses.

The district was erected in August 1923, but it was not until 1932 that the works were in a suitable condition to deliver water to the irrigable lands. The water supply for the District is obtained by diversions from the Belly River.

Financial policy of the District differed from that of large irrigation erected under the Irrigation Districts Act of Alberta. In general, Districts erected under the Act pay for construction costs out of the proceeds of bond issues having the lands served with irrigation as security. In the case of the Mountain View Irrigation District each member of the District agreed to provide labour and materials on the proportion that his irrigable area bore, to the total irrigable area of the district. The policy in general has been satisfactory and it has enabled this district to operate on extremely low annual charges.

(8) LEAVITT IRRIGATION DISTRICT

The Leavitt Irrigation district includes approximately 4,500 acres of irrigable Lands in Township 2 and 3, Ranges 25, 26, and 27, West of the 4th Meridian. The district was organized under a Minister's Order, dated October 29th,

1936, but construction of the distribution system was not commenced until September 1939 and the works are not yet entirely completed.

The Leavitt District receives its water supply from the Belly River, delivery being made through some fifteen miles of canals and reservoirs before reaching the irrigable lands. A combined diversion for Leavitt and Mountain View Districts, is made from the Belly River to Driggs Reservoir through a canal originally constructed and operated by the Mountain View District. From Driggs Reservoir the water for the Leavitt District follows the natural channel of Mami Creek for about one and one-half miles and as they rediverted into a canal extending eastward for a further distance of nine miles where delivery to the irrigable lands of the Leavitt is commenced. The enlargement of the works originally constructed by the Mountain View District, the works of the Driggs Reservoir and the canal up to the point of reaching the Leavitt District lands were constructed and paid for by the P.F.R.A. organization of the Dominion Government. The distributary canals inside the district boundaries were constructed by the District under some what similar arrangement for labour and materials as that used in constructing the works of the Mountain View District.

(9) AETNA IRRIGATION DISTRICT

The Aetna Irrigation District is a compact area of land comprising about 14,600 acres of bench land on the West side of the St. Mary River in Township 2, and 3, Ranges 24 and 25, West of the 4th Meridian. In Township 2 the west boundary of the District is the main supply canal of the south two tiers of sections in this Township between the St. Mary River and Lee Creek. The District has 8,030 acres which have been classified as irrigable lands.

The District was erected under the authority of a Minister's Order dated May 22nd, 1942. The water supply for the irrigable lands is received from the Belly River through the diversion works and canals used to supply water to the Leavitt District. A diversion in the Leavitt Canal is made at a point where this canal is close to the north bank of Lee Creek and from the diversion point the Valley of Lee Creek is crossed by means of a syphone to lands of Aetna District.

The construction of all the works required to deliver water to the upper limited of the Aetna District system, within the boundaries of the district, is being constructed by the district rate payers along lines which are similar to those employed in the Leavitt District. Irrigation operations in this District have not yet been carried out.

(10) EASTERN IRRIGATION DISTRICT

In 1903 the Canadian Pacific Railway Company selected a large block of land located along the Company's main railway line between Calgary and Medicine Hat as part of its land grant, and proceed to develop the area for irrigation. The Company spent \$18,000,000. on the construction of works to irrigate the Western and Eastern sections of this block. Works have not been constructed for the central section.

The Eastern Section Comprises of about 1,500,000 acres extending from Range 11 on the East to Range 18 on the West both inclusive and from the Red Deer River north to the Bow River on the South. The Section includes about 200,000 acres of irrigable lands which were opened for settlement in the spring of 1914 and the first deliveries of irrigation water were made that year.

Adverse economic and agricultural conditions during and following World War I delayed satisfactory settlement of the area and while those who did purchase land were able to make a fair living they were unable to pay for the irrigation works. This unsatisfactory economic situation led to suggestions being advanced that the Company transfer the irrigation works to the land owners so that the irrigation system could be operated as a co-operative enterprise. The discussions on such a proposal finally resulted in an agreement being ratified by the Provincial Legislature whereby the Company in 1953 transferred to the Eastern Irrigation District, which had been formed, all the irrigation works, land contracts and unsold lands in the district, together with \$390,000 as a capital reserve for the replacement of large structures.

The arrangement permitted a downward adjustment in the purchase price of land with improved economic conditions through out the district. Under the revided set up the district has progressed steadily in its development of irrigation farming through out the area.

(11) ROSS CREEK IRRIGATION DISTRICT

The Ross Creek Irrigation district comprises of some 2,068 acres of irrigable lands in Township 12, Ranges 3, 4, and 5, West of the 4th Meridian. The district was organized by a Minister's Order dated September 14th, 1949.

The P.F.R.A. constructed the reservoir and the diversion works on Gros Ventre Creek. The farmers with P.F.R.A. engineering started construction of the distribution works. Under the new policy, approved for the construction of small projects where the district would repay the Government 50% of the cost up to a maximum of \$10.00 per acre after the Government had constructed

the works, the province took over the construction of the Ross Creek Project on July 24, 1950.

Total cost of the project to Alberta was \$99,433.33. The P.F.R.A. initial expenditure was \$47,998.00. Since the original construction they have spent an additional sum on installation of control works on Gros Ventre Creek and repairs to the main canal.

Construction was completed in the fall of 1951 and the district has now been operating for two years and have been able to make two payments on their share of the cost with a water rate of \$1.25 per acre.

At least a portion of this project is now producing specialized crops for sale in the city of Medicine Hat.

(12) MACLEOD IRRIGATION DISTRICT

The Macleod Irrigation District is a small irregular tract of bench land on the south side of the Oldman River which extends eastward from the town of Fort Macleod for a distance of about six miles. The District as presently established includes sixty-eight quarter sections and the present irrigation plan is to limit irrigation operations to not more than forty acres per quarter section with a total irrigated area in the District of 2633 acres.

The District was erected by authority of a Minister's Order dated June 26th, 1940. The water supply for the lands of the district is obtained by pumping from the Oldman River. The pumping plant intake is located about three miles upstream from the town of Fort Macleod and the irrigation water is first taken to a small reservoir located close to the upper limit of the District. From the reservoir, the distribution of water to the individual parcels of the district is carried out by a

system of gravity canals.

The pumping plant installation, together with the construction of the reservoir works and the Main Canal to a division gate location about three miles east of the reservoir, were carried out by the P.F.R.A. A further section of canal which includes drops and fills was constructed by the Water Resources Office and the balance of the distributary system is being constructed by the District ratepayers.

The system was placed in operation for a short period in 1953, but very little irrigating was carried out and most of the water run through the system was used to fill dug-outs for stock watering purposes.

WESTERN IRRIGATION DISTRICT

The present Western Irrigation District is a selected part of the area which originally constituted The Western Section of the Canadian Pacific Railway Company's Bow River Valley Irrigation Project.

The Western Section included about 1,000,000 acres of bench lands on the North side to the Bow River lying East of the City of Calgary. Some 218,980 acres of these lands were classified as irrigable, and for purposes of serving these irrigable lands with irrigation water, the Railway Company constructed some 1,566 miles of Main Secondary and Lateral canals. Deliveries of irrigation were first made in 1907 to a small area in the Gleichen District and diversions from the Bow River have been made annually since that year.

An account of precipitation and general growing conditions in the area being such that dry farming methods produced crop yields which on the average, compared favourably with similar crops where irrigation was used and because

of a lack of markets for specialized irrigation crops, irrigation farming in the Western Section did not attain a very high state of development. The largest area irrigated in any year was in 1937 when 50,866 acres, or about 23% of the irrigable lands, were irrigated. In the years from 1921 to 1943 inclusive there were eight years when less than 5% of the irrigable lands were irrigated, and the yearly average irrigated area over the 23 year period was only 11% of the irrigable area.

The general apathy toward irrigation which prevailed over a large part of the project together with an unsatisfactory economic situation, which developed in spite of a low additional charge of \$10.00 per acre for irrigable land, created a state of discontent amongst rate payers generally. By 1943 an agreement was reached with the Company whereby an Irrigation District was erected which included the ratepayers favorably inclined to irrigation and the Company's irrigation works were then turned over to an elected Board of Trustees.

The Western Irrigation District with an irrigable area reduced to about 50,000 acres commenced operating the newly organized irrigation system in 1944 and have carried on operations since that time.

SECTION (17) DUCKS UNLIMITED

While this organization is largely dedicated to the production of more ducks it is also an active participant in water conservation generally.

The head office for Alberta is in Edmonton and branch offices are maintained at Strathmore, Brooks and Hanna.

In the past thirteen years Ducks Unlimited have spent 1 1/4 million dollars in Alberta. The average cost of their projects would be about \$5,000.00.

Ducks Unlimited cooperate with the Province of Alberta, the Irrigation

Districts and any other organization which have in mind the construction of dams or canals which conserve water for beneficial use. (See section on Water Stabilization Committee).

The excellent results obtained by the Alberta organization have played a large part in the continuing support of American sportsmen in this worthwhile endeavour.

